Report

Buzzards Bay Sediment Data Report 1985 - 1986

Department of Environmental Protection
Division of Water Pollution Control

BBP-89-15

The Buzzards Bay Project is sponsored by
The U.S. Environmental Protection Agency and
The Massachusetts Executive Office of Environmental Affairs.

BUZZARDS BAY

1985-1986

SEDIMENT DATA REPORT

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THE BUZZARDS BAY PROJECT

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FOREWORD

In 1984, Buzzards Bay was one of four estuaries in the country chosen to be part of the National Estuary Program. The Buzzards Bay Project was initiated in 1985 to protect water quality and the health of living resources in the bay by identifying resource management problems, investigating the causes of these problems, and recommending actions that will protect valuable resources from further environmental degradation. This multi-year project, jointly managed by United States Environmental Protection Agency and the Massachusetts Executive Office of Environmental Affairs, utilizes the efforts of local, state, and federal agencies, the academic community and local interest groups in developing a Master Plan that will ensure an acceptable and sustainable level of environmental quality for Buzzards Bay.

The Buzzards Bay Project is focusing on three priority problems: closure of shellfish beds, contamination of fish and shellfish by toxic metals and organic compounds, and high nutrient input and the potential pollutant effects. By early 1990, the Buzzards Bay Project will develop a Comprehensive Conservation and Management Plan to address the Project's overall objectives: to develop recommendations for regional water quality management that are based on sound information, to define the regulatory and management structure necessary to implement the recommendations, and to educate and involve the public in formulating and implementing these recommendations.

The Buzzards Bay Project has funded a variety of tasks that are intended to improve our understanding of the input, fate and effects of contaminants in coastal waters. The Project will identify and evaluate historic information as well as generate new data to fill information gaps. The results of these Project tasks are published in this Technical Series on Buzzards Bay.

This report represents the technical results of an investigation funded by the Buzzards Bay Project. The results and conclusions contained herein are those of the author(s). These conclusions have been reviewed by competent outside reviewers and found to be reasonable and legitimate based on the available data. The Management Committee of the Buzzards Bay Project accepts this report as technically sound and complete. The conclusions do not necessarily represent the recommendations of the Buzzards Bay Project. Final recommendations for resource management actions will be based upon the results of this and other investigations.

David A. Fierra

David Fierra, Chairman, Management Committee
Environmental Protection Agency

FOREWORD

The Massachusetts Division of Water Pollution Control was established by the Massachusetts Clean Water Act, Chapter 21 of the General Laws as amended by Chapter 685 of the Acts of 1966. Included in the duties and responsibilities of the Division is the periodic examination of the water quality of various coastal waters, rivers, streams and ponds of the Commonwealth, as stated in section 27, paragraph 5 of the Acts. This section further directs the Division to publish the results of such examinations together with the standards of water quality established for the various waters. The Technical Services Branch of the Division of Water Pollution Control has, among its responsibilities, the execution of this directive. This report is published under the Authority of the Acts and is among a continuing series of reports issued by the Division presenting water quality data and analyses, water quality management plans, baseline and intensive limnological studies and other special studies.

ACKNOWLEDGMENTS

The successful completion of an undertaking such as this one requires the coordinated efforts of a great many talented professionals. The Division of Water Pollution Control would like to extend its appreciation to:

The staff of the Technical Services Branch (TSB) at Westborough for their assistance in sample collection; notably Steven G. Halterman, Christine Duerring, Robert Kubit and Patricia Austin.

Leigh Bridges, Captain Shirley Mitchell and Mate Louis Emerald of the Massachusetts Division of Marine Fisheries who provided and captained the research vessel "F.W. Wilbour" used in collecting the outer bay samples.

Burt Limeburner, George Souza, Robert Sheehy, John Freitas and David Roach, shellfish officers for the respective towns of Bourne, Falmouth, Wareham, Dartmouth and Westport.

The Inorganic and Organic Chemistry Sections at the Lawrence Experiment Station, notably: Alba Flaherty, Ken Hulme, Robert Serabian, Tom Pappalardo and Ken Atkinson.

Ken Dominick, Senior Civil Engineer Draftsman, who prepared the graphics contained in this report; the secretarial staff at TSB, notably Aline Charest; and last but not least Terry Beaudoin. Terry who was hired during the fall of 1986 was largely responsible for conducting all of the grain size analysis, as well as the data entry and computer graphics. Without her efforts this project would not have been completed.

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ABSTRACT

Massachusetts Division of Water Pollution Control

1986-1986 Buzzards Bay Sediment Survey

Pages 75, Tables 15, Figures 37

Levels of selected priority pollutants are reported from 22 sediment stations in the major estuaries, inner embayments and outer bay of Buzzards Bay. The study represents the Division of Water Pollution Control's first extensive survey of marine sediments.

Sediments were analyzed for total metals (cadmium, chromium, copper, lead, mercury and nickel), polychlorinated biphenyls (PCB's), polycyclic aromatic hydrocarbons (PAH's) and grain size. Materials and methods, analytical procedures, limits of detection and water quality classifications are also reported.

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INTRODUCTION

The Buzzards Bay 1985-1986 sediment survey report represents the Division's first extensive survey of selected pollutant levels in marine sediments. While the Division of Water Pollution Control's mandated concerns are with the Commonwealth's surface waters, it has long recognized that a better assessment of pollutant loadings could be gained through evaluation of other available data sources including sediments and biota tissue. This data report is the third in a series of studies conducted by the Technical Services Branch of the Division of Water Pollution Control to update the Commonwealth's knowledge on water quality conditions within the Buzzards Bay Drainage Basin. The study is also part of a national estuarine management program developed by the Office of Marine and Estuarine Protection and Region I of the Environmental Protection Agency. The program was initiated to promote and develop coordinated efforts between federal, state, local authorities, research institutions and the public to identify and correct the environmental problems effecting this nation's estuaries. The Division through its Technical Services Branch proposed and received funding during FY85 and FY86 to conduct a broad scale assessment of the levels of selected priority pollutants (PAH's, PCB's and heavy metals) at stations located throughout the tidal portions of Buzzards Bay, excepting the waters of the Acushnet River and New Bedford Harbor.

The study had three objectives:

1. To provide data on levels of PCB's as Aroclors (1016/1242, 1248, 1254, 1260); heavy metals (Cu, Ni, Pb, Cd, Cr, and Hg), and PAH's from sediment stations located throughout the bay.

2. To compare the levels of the pollutants listed above with findings reported from the Battelle Superfund study and other pertinent studies.

3. To make a determination based on these findings as to the influence of the New Bedford Harbor/Acushnet River PCB problem on sediments found in the upper reaches of Buzzards Bay.

This report presents the data collected during the summers of 1985 and 1986. Subsequent reports by the Division will provide the Division's interpretation of these data and address objectives 2 and 3.

Due to the size of the Buzzards Bay Drainage Basin and limitations in equipment and personnel, the Division decided to survey the basin by areas. These areas were selected based on similarities in features and for logistical purposes (see Figure 1). They are as follows:

Area I - The subdrainage basins and inner embayments of the western shore from the Rhode Island/Massachusetts state line to the Fairhaven/Mattapoisett town line.

Area II - The subdrainage basins and inner embayments from the Fairhaven/Mattapoisett town line to Buttermilk Bay in Bourne.

Area III - The subdrainage basins and inner embayments of the eastern shore from the Cape Cod Canal to Woods Hole, Falmouth.

Area IV - The Elizabeth Islands.

Area V - The Outer Bay, the water seaward of the headlands out to the mouth of the bay.

Station locations were selected with the following criteria in mind:

The Station had been previously sampled by other researchers.

The Stations were located in the vicinity of potential sources.

The Stations were located in areas where fine grained deposits were known to exist.

An initial screening of potential stations identified 11 inner embayments for further examination.

During August of 1985, six stations located in the Outer Bay (Area V), north of an imaginary line drawn between the towns of Mattapoisett and Woods Hole, Falmouth were sampled. During the late spring and early summer of 1986, several preliminary surveys were made in the 11 inner embayments. During these preliminary surveys the substrate type was confirmed along with the stations' proximity to shellfish resources. A total of ten sites were selected. All of the inner embayment stations were sampled by 10/23/86. On 10/29/86, with the assistance of the Massachusetts Division of Marine Fisheries, the last of six stations within the lower Outer Bay and Elizabeth Islands were surveyed. All chemical analysis was completed by the end of November, 1986. The Technical Services Branch collected a total of 29 samples from 22 stations during the course of this project. (Tables 5 and 6, and Figures 6-10 locate the station locations).

Overlying water quality data as well as temperature, salinity and dissolved oxygen profiles were also collected and are reported in the respective Buzzards Bay 1985 and 1986 Part A Water Quality Data Reports.

Field sampling was conducted according to methods described in this report and according to the Division's Standard Operating Procedures document which was developed from standardized and approved sampling methodologies. Copies of this document are on file at the Technical Services Branch office in Westborough, Massachusetts. Grain size analysis was conducted according to a modification of the Plumb method. Analytical protocols were developed from EPA approved procedures and referenced methods. Specific information is contained in the Materials and Methods section as well as Tables 14 and 15.

DESCRIPTION OF BASIN

Buzzards Bay Drainage Basin (95)

Buzzards Bay is a prominent coastal embayment on the New England coast nestled between Cape Cod and southern Massachusetts. The mouth of the Bay opens south into Rhode Island Sound. Along its western shore the drainage basin is formed by seven coastal river basins, with a total drainage area of approximately 350 square miles. From east to west the major river basins are: Agawam, Wankinco, Weweantic, Mattapoisett, Acushnet, Paskamanset/Slocums, and Westport.

Along the easterly shore from the Cape Cod Canal to Woods Hole, Falmouth, small river basins provide an additional 35 square miles of drainage area. The prominent freshwater streams along the eastern shore from north to south are: the Back River, Pocasset River, Wild Harbor River, and Herring Brook. A chain of islands (the Elizabeth Islands), separated by tidal channels (holes), forms the southeastern side of the Bay.

Geologically, the Buzzards Bay Basin is characterized as a low granitic upland with glacial till and outwash deposits forming the soils. The terrain can be described as low and gently rolling with numerous lakes and marshes. Maximum elevations range between 200 to 300 feet in the northernmost reaches of the basin.

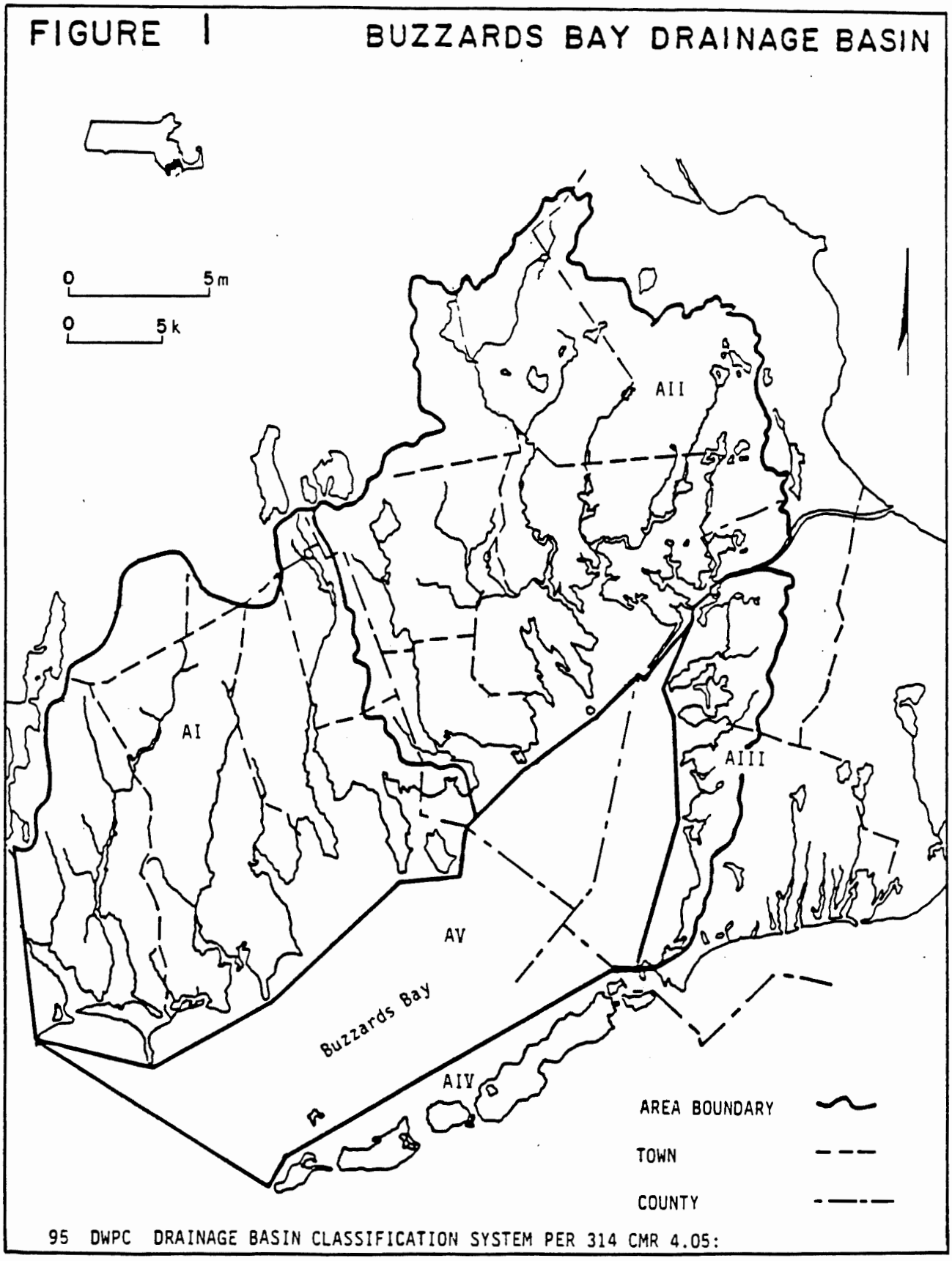
The Bay itself is 28 miles long, averages eight miles in width and has an average depth of 50 feet in the central basin. The surface area of the Bay is estimated to be 235 square miles.

The numerous harbors and coves located along the Bay's jagged coastline are used extensively for recreational and commercial purposes, with over 4,300 slips and moorings along the Bay. Over 20,000 vessels pass through the Cape Cod Canal and Buzzards Bay annually, transporting over 19 million tons of commercial cargo including most of the number 2 fuel used in New England. New Bedford Harbor is the industrial and commercial center of the basin, carrying over from its earlier days as a principal whaling port. It is now one of the most important fishing ports in the United States, often leading the nation in the of value of landings.

The harbor also suffers the most severe water quality problems. Extensive contamination of New Bedford Harbor was first documented during the mid-70's when a few sediment samples from the harbor were first analyzed for aromatic hydrocarbons. Interference in the expected results led to the discovery that the samples contained high levels of polychlorinated biphenyls (PCB's). Subsequent studies by other researchers, the Environmental Protection Agency, and state agencies such as the Division of Water Pollution Control and the Division of Marine Fisheries confirmed the widespread contamination of sediments and biota within the Acushnet River Estuary, Inner Harbor and portions of the Outer New Bedford Harbor. The likely sources for the PCB's have been traced to two industrial operations

which discharged wastewaters directly to the harbor and indirectly through the New Bedford municipal sewer system. The sediments underlying the entire estuary and Inner Harbor contain elevated levels of PCB's. The concentrations range from a few parts per million (ppm) to 100,000 ppm. Currently the entire estuary and harbor have been designated by the U.S. Environmental Protection Agency as a superfund site. Additional problems within the harbor include combined sewer overflows, industrial discharges, street runoff, discharges from marine vessels, municipal sewage treatment plant discharges, and poor water circulation within the Inner Harbor. Problems in other harbors within the basin include street runoff from urban development, discharges from failing septic systems, watercraft, leachate from landfills and agricultural runoff.

FIGURE 1 BUZZARDS BAY DRAINAGE BASIN



95 DWPC DRAINAGE BASIN CLASSIFICATION SYSTEM PER 314 CMR 4.05:

TABLE 1

BUZZARDS BAY BASIN AREA I - CLASSIFICATION

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION*	CLASSIFICATION
New Bedford Reservoir, Acushnet	Emergency water supply	Same	B	B
Acushnet River from the outlet of New Bedford Reservoir, Acushnet, to Hamlin Road, Acushnet, New Bedford	Bathing, recreational boating, fish and wildlife propagation,	Same	B	B
Acushnet River from Hamlin Road, Acushnet, New Bedford, to Main Street, Acushnet, New Bedford	Recreational boating, fish and wildlife propagation, fishing, waste waste assimilation	Bathing, recreational boating, fish & wildlife propagation, fishing	C	B
Acushnet River from Main Street, Acushnet, New Bedford, to Route 6, Acushnet, New Bedford, Fairhaven	Recreational boating, fish and wildlife propagation, fishing, industrial processing and cooling, waste assimilation	Bathing, recreational boating, fish & wildlife propagation, fishing, industrial processing and cooling	U[1]	SB
Inner New Bedford Harbor New Bedford, Fairhaven	Recreational boating, fish & wildlife propagation, fishing, industrial processing & cooling, waste assimilation	Bathing, recreational boating, fish and wildlife propagation, fishing, industrial processing & cooling	U[2]	SB
Outer New Bedford Harbor, New Bedford, Fairhaven	Recreational boating, fish & wildlife propagation, fishing, industrial processing & cooling, waste assimilation	Bathing, recreational boating, fish & wildlife propagation, industrial processing & cooling shellfishing	SC[3]	SA

TABLE 1 (CONTINUED)

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION	CLASSIFICATION
Clark Cove, New Bedford, Dartmouth	Bathing, recreational boating, fish & wildlife propagation, fishing, industrial processing & cooling, waste assimilation	Bathing, recreational boating, fish & wildlife propagation, fishing, industrial processing & cooling, shellfishing	SB[4]	SA
Apponagansett Bay, Dartmouth	Bathing, recreational boating, fish & wildlife propagation, fishing	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	SB[5]	SA
Paskamanset River Dartmouth, New Bedford	Bathing, recreational boating, fish & wildlife propagation, fishing	Same	B1	B
Slocums River, Dartmouth	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	Same	SA	SA
Shingle Island River, Dartmouth	Bathing, recreational boating, fish & wildlife propagation, fishing	Same	B	B
Noquochoke Lake, Dartmouth	Bathing, recreational boating, fish & wildlife propagation, fishing	Same	B	B
Westport River, East Branch from the outlet of Noquochoke Lake, Dartmouth, to Old County Road, Westport	Recreational boating, fish & wildlife propagation, fishing	Bathing, recreational boating, fish and wildlife life propagation, fishing	C	B
Westport River, East Branch from Old County Road, Westport to the mouth, Westport	Bathing, recreational boating, fish & wildlife life propagation, fishing, shellfishing	Same	SB[6]	SA

TABLE 1 (CONTINUED)

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION	CLASSIFICATION
Westport River, West Branch, Westport	Bathing, recreational boating, fish & wildlife life propagation, fishing, shellfishing	Same	SB[7]	SA
Nasketucket Bay, Fairhaven, Mattapoisett	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	Same	SA	SA

* SOURCE: Massachusetts Department of Environmental Quality Engineering, Southeast Regional Office, shellfish sanitation records.

Massachusetts Department of Fisheries, Wildlife & Environmental Law Enforcement, Division of Marine Fisheries Report, entitled, "Massachusetts Marine Fisheries Assessment of Mid-Decade," 1985.

[1] All of the tidal portions of the Acushnet River closed to fishing and shellfishing by Massachusetts Department of Public Health. Chapter 130, Section 74 M.G.L.

[2] All of the Inner Harbor is closed to fishing and shellfishing of any kind by the Massachusetts Department of Public Health. Chapter 130, Section 74 M.G.L.

[3] All of the Outer Harbor is closed to lobstering, inner portions from Ricketsons Point, Dartmouth to Wilbur Point Fairhaven closed to the taking of ground fish by Massachusetts Department of Public Health. Chapter 130, Section 74 M.G.L.

[4] All of Clark Cove closed to lobstering, the taking of ground fish and shellfishing by the Massachusetts Department of Public Health. Chapter 130, Section 74 M.G.L.

[5] Portions of Apponagansett Bay closed to shellfishing in accordance with provisions of Chapter 130, Section 74 M.G.L.

[6] Portions of Westport River East Branch closed to shellfishing in accordance with provisions of Chapter 130, Section 74 M.G.L.

[7] Portions of Westport River West Branch closed to shellfishing in accordance with provisions of Chapter 130, Section 74 M.G.L.

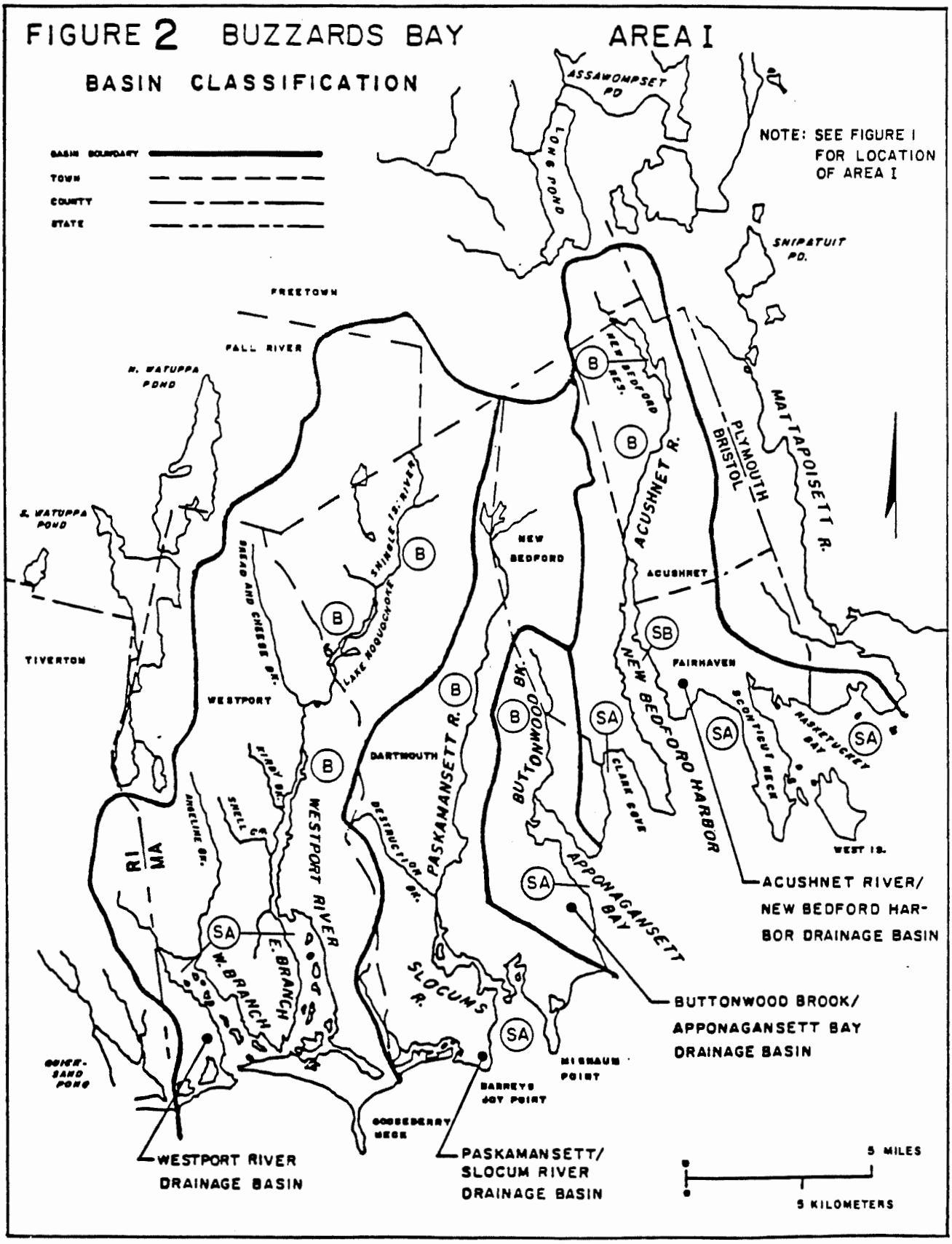


FIGURE 2 BUZZARDS BAY AREA I
BASIN CLASSIFICATION
BASIN BOUNDARY
TOWN
COUNTY
STATE
NOTE: SEE FIGURE I FOR LOCATION OF AREA I
ASSAWOMPSET PD
LONG POND
SNIPATUIT PD.
FREETOWN
FALL RIVER
N. WATUPPA POND
S. WATUPPA POND
TIVERTON
WESTPORT
BREAD AND CHEESE BK.
SHINGLE IS. RIVER
LAKE NOQUOCHOKE
NEW BEDFORD
NEW BEDFORD HBR.
ACUSHNET R.
PLYMOUTH
BRISTOL
MATTAPOISETT R.
ACUSHNET
FAIRHAVEN
SCONTICUT NECK
NASKETUCKET BAY
WEST IS.
DARTMOUTH
PASKAMANSETT R.
BUTTONWOOD BK.
CLARK COVE
APPONAGANSETT BAY
DESTRUCTION BK.
EIRDY BK.
SHELL BK.
ANGELINE BR.
RI
MA
WESTPORT RIVER
E. BRANCH
W. BRANCH
SLOCUMS R.
QUICKSAND POND
GOOSEBERRY NECK
BARNEYS JOY POINT
MISHAUM POINT
ACUSHNET RIVER/ NEW BEDFORD HARBOR DRAINAGE BASIN
BUTTONWOOD BROOK/ APPONAGANSETT BAY DRAINAGE BASIN
WESTPORT RIVER DRAINAGE BASIN
PASKAMANSETT/ SLOCUM RIVER DRAINAGE BASIN
5 MILES
5 KILOMETERS

TABLE 2

BUZZARDS BAY BASIN AREA II - CLASSIFICATION

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION*	CLASSIFICATION
Little Buttermilk Bay, Buttermilk Bay, Wareham, Bourne	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	Same	SB[1]/SA	SA
Onset Bay, Wareham	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	Same	SA	SA
Agawam River, Plymouth, Wareham	Bathing, recreational boating, fish & wildlife propagation, fishing, irrigation, waste assimilation	Same	B/SB[2]	B/SA
Wankinco River, Carver, Plymouth, Wareham	Bathing, recreational boating, fish & wildlife propagation, fishing, irrigation	Same	B/SB[2]	B/SA
Sippican River from the headwaters, Rochester, Wareham, to County Road, Marion, Wareham	Bathing, recreational boating, fish & wildlife propagation, fishing, irrigation	Same	B	B
Sippican River from County Road, Marion, Wareham, to the mouth, Marion, Wareham	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	Same	B/SB	B/SA

TABLE 2 (CONTINUED)

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION	CLASSIFICATION
Weweantic River from the headwaters, Carver, to the outlet of Horseshoe Pond, Wareham	Bathing, recreational boating, fish & wildlife propagation, fishing	Same	B	B
Weweantic River from the outlet of Horseshoe Pond Wareham, to the mouth, Wareham, Marion	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	Same	SA	SA
Wareham River, Wareham	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing, waste assimilation	Same	SB[3]/SA	SB
Sippican Harbor, Marion	Bathing, recreational boating, fish & wildlife propagation, fishing	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	SB[4]	SA
Mattapoisett River, Mattapoisett, Rochester	Bathing, recreational boating, fish & wildlife propagation, fishing, irrigation	Same	B/SB[5]	B
Mattapoisett Harbor, Mattapoisett	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	Bathing, recreational boating, fish & wildlife propagation, fishing, shellfishing	SA[6]	SA

TABLE 2 (CONTINUED)

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION	CLASSIFICATION
Hiller Cove, Mattapoisett, Marion	Bathing, recreational boating, fish & wild-life propagation, fishing	Bathing, recreational boating, fish & wild-life propagation, fishing, shellfishing	SB	SA
All other freshwater streams within Buzzards Bay Basin Area II	---	---	---	B
All other coastal waters within Buzzards Bay Basin Area II	---	---	---	SA

* SOURCE: Massachusetts Department of Environmental Quality Engineering, Southeast Regional Office, shellfish sanitation records.

Massachusetts Department of Fisheries, Wildlife & Environmental Law Enforcement, Division of Marine Fisheries Report, entitled, "Massachusetts Marine Fisheries Assessment at Mid-Decade," 1985.

1 Portions of Buttermilk Bay in Wareham, Little Buttermilk Bay in Bourne are closed to shellfishing in accordance with provisions of Massachusetts General Laws, Chapter 130 Section 74A (MGL Ch. 130 S74A).

2 Tidal portions of Agawam and Wankinco rivers in Wareham are closed to shellfishing in accordance with provisions of MGL Ch. 130 S74A.

3 Portions of Wareham River, Wareham are closed to shellfishing in accordance with provisions of MGL Ch. 130 S74A.

4 Portions of Sippican Harbor including Briggs Cove, Marion are closed to shellfishing in accordance with provisions of MGL Ch. 130 S74 (seasonal closure), Ch. 130 S74A.

5 Tidal portions of Mattapoisett River are closed to shellfishing in accordance with provisions of MGL Ch. 130 S74A.

6 Portions of Mattapoisett Harbor including all of Eel Pond are closed to shellfishing in accordance with provisions of MGL Ch. 130 S74A.

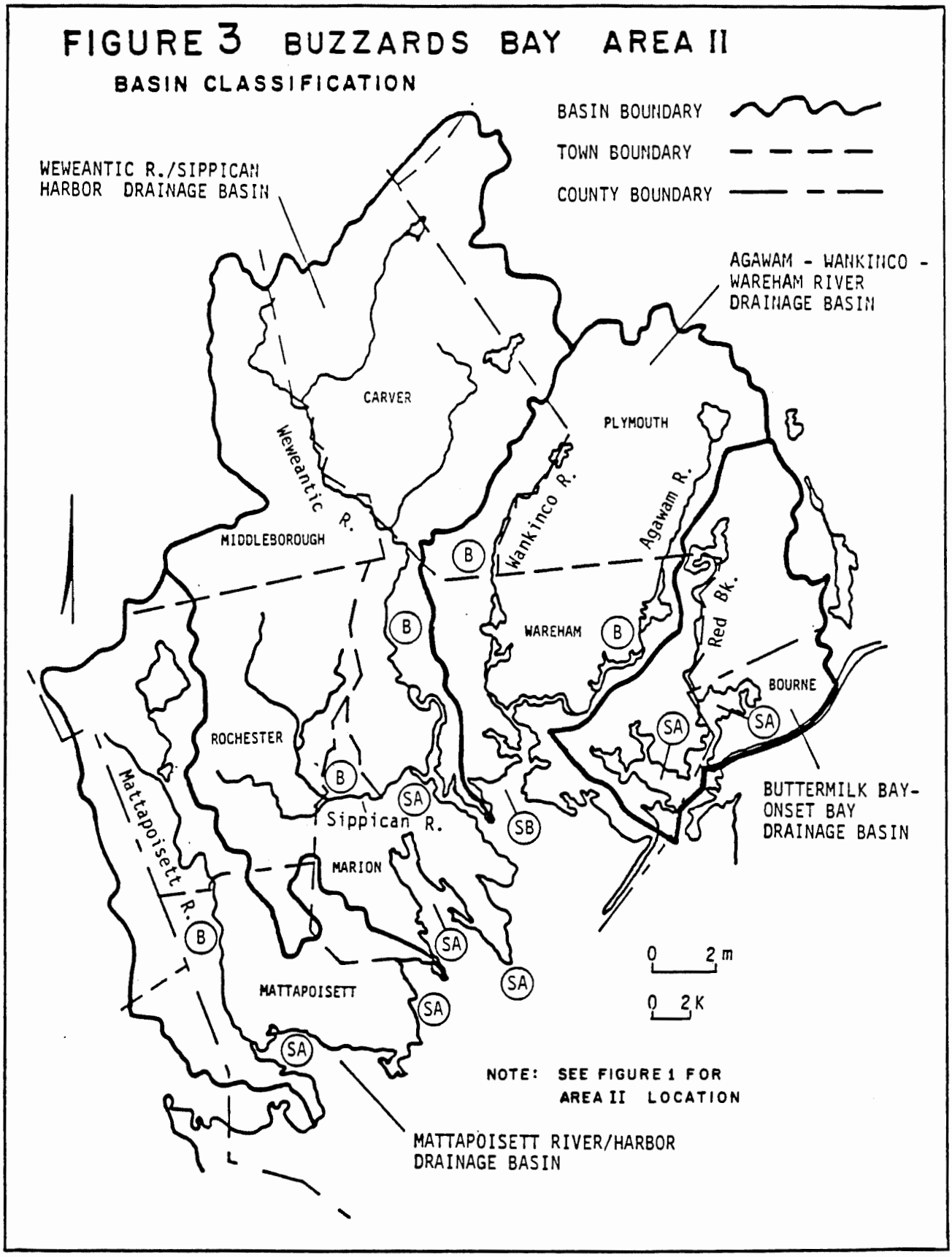


FIGURE 3 BUZZARDS BAY AREA II
BASIN CLASSIFICATION
BASIN BOUNDARY
TOWN BOUNDARY
COUNTY BOUNDARY
WEWEANTIC R./SIPPICAN HARBOR DRAINAGE BASIN
AGAWAM - WANKINCO - WAREHAM RIVER DRAINAGE BASIN
CARVER
PLYMOUTH
Weweantic R.
Wankinco R.
Agawam R.
MIDDLEBOROUGH
WAREHAM
Red Bk.
BOURNE
ROCHESTER
Mattapoisett R.
Sippican R.
MARION
MATTAPOISETT
BUTTERMILK BAY-ONSET BAY DRAINAGE BASIN
0 2 m
0 2K
NOTE: SEE FIGURE 1 FOR AREA II LOCATION
MATTAPOISETT RIVER/HARBOR DRAINAGE BASIN
B
SA
SB

TABLE 3

BUZZARDS BAY BASIN AREA III - CLASSIFICATION

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION*	CLASSIFICATION
Cape Cod Canal, Bourne and Sandwich	Recreational boating, fish & wildlife propagation, fishing, industrial processing & cooling, assimilation	Same	SB	SB
Phinneys Harbor, Bourne	Recreational boating, fish & wildlife propagation, fishing, bathing, restricted shellfishing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SB[1]/SA	SA
Pocasset Harbor, Bourne	Recreational boating, fish & wildlife propagation, fishing, bathing, shellfishing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SA	SA
Red Brook Harbor, Bourne	Recreational boating, fish & wildlife propagation, fishing, bathing, restricted shellfishing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SB[2]/SA	SA
Megansett Harbor, Bourne and Falmouth	Recreational boating, fish & wildlife propagation, fishing, bathing, shellfishing	Recreational boating, bathing, fish & wildlife propagation, fishing shellfishing	SA	SA
Wild Harbor, Falmouth	Recreational boating, fish & wildlife propagation, fishing, bathing, restricted shellfishing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SA	SA
Herring Brook, Falmouth	Recreational boating, fish & wildlife propagation, fishing, bathing, restricted shellfishing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SA	SA

TABLE 3 (CONTINUED)

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION	CLASSIFICATION
West Falmouth Harbor, Falmouth	Recreational boating, fish & wildlife propagation, fishing, bathing, shellfishing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SA	SA
Great Sippewisset Creek, Falmouth	Recreational boating, fish & wildlife propagation, fishing, bathing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SA	SA
Little Sippewisset Creek, Falmouth	Recreational boating, fish & wildlife propagation, fishing, bathing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SA	SA
Quissett Harbor, Falmouth	Shellfishing, recreational boating, fish & wildlife propagation, fishing, bathing	Recreational boating, bathing, fish & wildlife propagation, fishing, shellfishing	SB[3]/SA	SA
All other freshwater streams within Buzzards Bay Basin Area III	---	---	---	B
All other coastal waters within Buzzards Bay Basin Area III	---	---	---	SA

* SOURCE: Massachusetts Department of Environmental Quality Engineering, Southeast Regional Office, shellfish sanitation records.

Massachusetts Department of Fisheries, Wildlife & Environmental Law Enforcement, Division of Marine Fisheries Report, entitled, "Massachusetts Marine Fisheries Assessment at Mid-Decade," 1985.

1 Portions of Back River, Pocasset River and Eel Pond located within Phinneys Harbor, Bourne are closed to shellfishing in accordance with provisions of Massachusetts General Laws Chapter 130, Section 74A (MGL Ch. 130 S74A).

2 Portions of Red Brook Harbor, Bourne are seasonally closed to shellfishing in accordance with provisions of MGL Ch. 130 S74

3 Portions of Quissett Harbor, Falmouth are closed to shellfishing in accordance with provisions of MGL Ch. 130 S74.

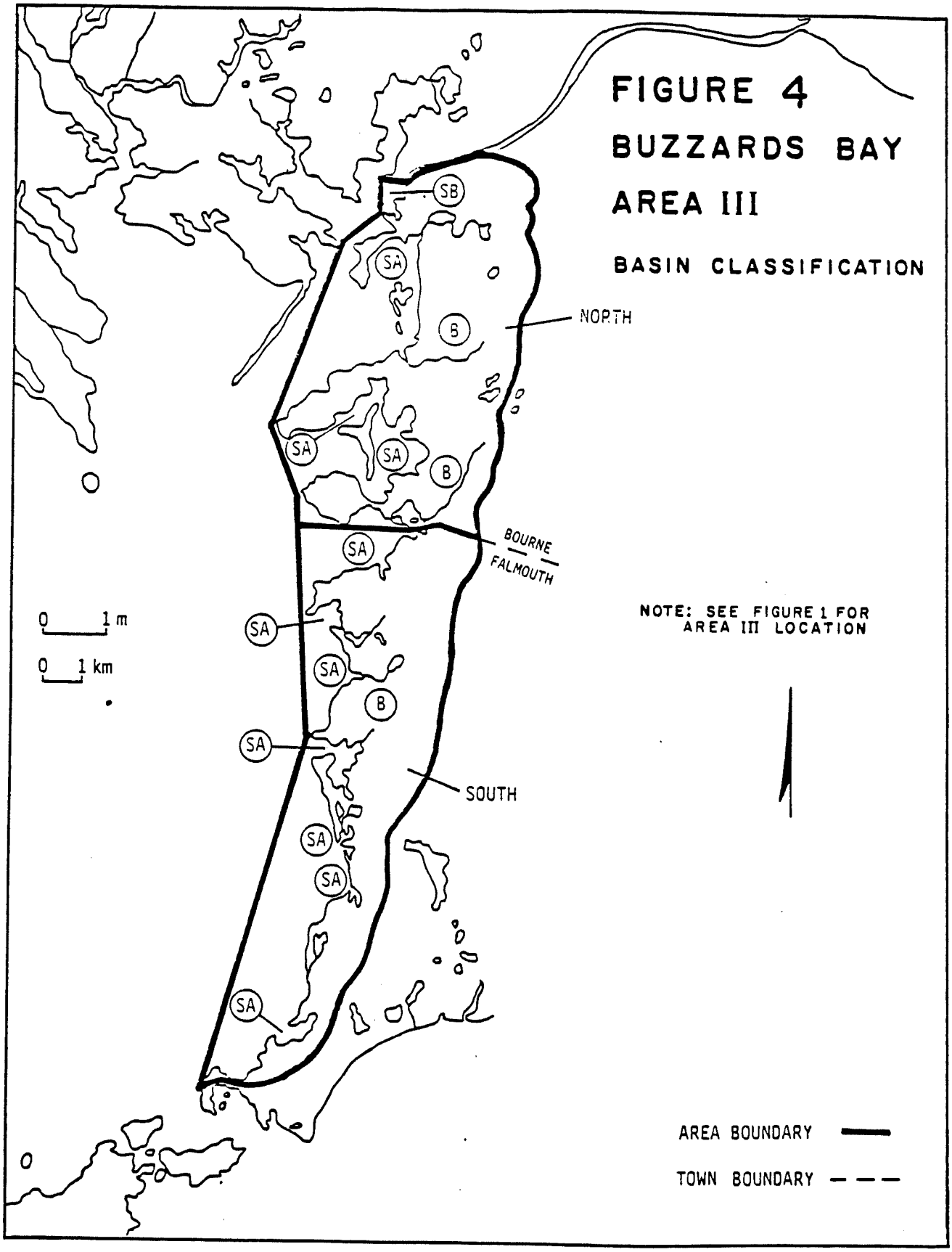


FIGURE 4
BUZZARDS BAY
AREA III
BASIN CLASSIFICATION
NORTH
BOURNE
FALMOUTH
SOUTH
SB
SA
B
0 1 m
0 1 km
NOTE: SEE FIGURE 1 FOR AREA III LOCATION
AREA BOUNDARY
TOWN BOUNDARY

TABLE 4

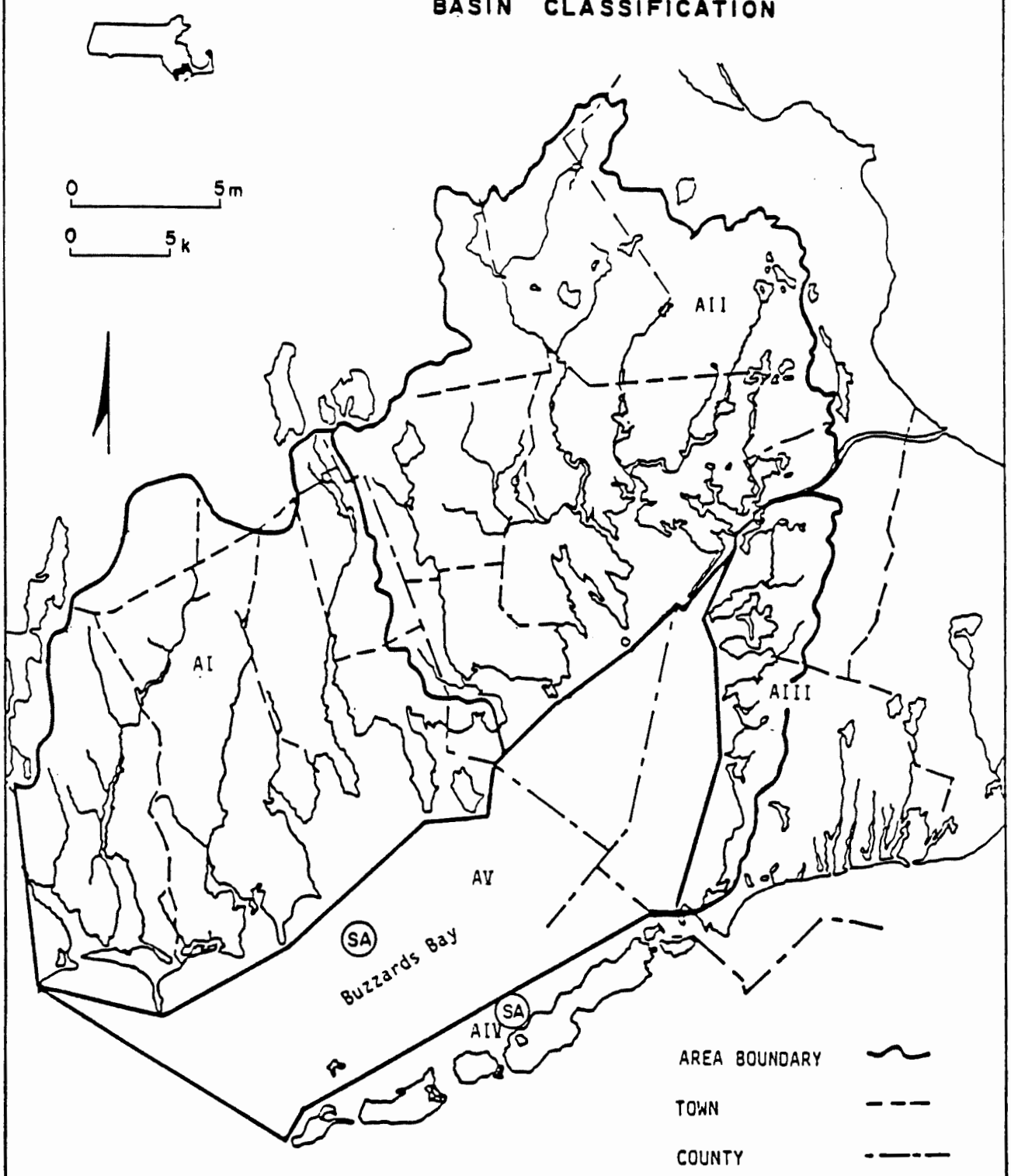
BUZZARDS BAY BASIN AREA IV & V - CLASSIFICATION

BOUNDARY	PRESENT USE	ANTICIPATED FUTURE USE	PRESENT CONDITION*	CLASSIFICATION
All other freshwater streams within Buzzards Bay Basin	--	--	--	B
All other coastal waters within Buzzards Bay Basin	--	--	--	SA

* Cuttyhunk Pond seasonally closed to shellfishing in accordance with provisions of Massachusetts General Laws Chapter 130, Section 74A.

FIGURE 5 BUZZARDS BAY AREAS IV & V

BASIN CLASSIFICATION



95 DWPC DRAINAGE BASIN CLASSIFICATION SYSTEM PER 314 CMR 4.05:

MATERIALS AND METHODS

Field Collections:

The sampling techniques employed during the collection period varied with the depth of water and the actual sampling devices employed. During the summer of 1985, the Division of Water Pollution Control's Technical Services Branch contracted with the Division of Marine Fisheries for use of their research vessel F.W. Wilbour. The Wilbour provided a working platform for collection of water quality and sediments from stations located in the Outer Bay and along the Elizabeth Island Chain; areas identified by the Division for reporting purposes as Areas V and IV. Station locations were verified by use of the on-board LORAN C navigational equipment. Samples were rejected if they appeared to contain a high percentage of coarse grained sediments. During the initial collections in the Outer Bay, the Division employed two sampling devices. The first, a Phleger corer, is a free-fall device suitable for collection of soft, sandy or semi-compacted sediments. It is composed of a hydrodynamically shaped lead weight with a stabilizing fin assembly which minimizes planning and turbulence during descent. The lower section of the corer is composed of variable lengths of galvanized steel coring tube having an internal diameter of 37 mm. Sediments are retained in the tube by the presence of a stainless steel core-catcher, the leaves of which remain open during the corer's penetration into the substrate and are then pressed closed by the weight of the trapped sediments. The Division used a 60 cm coring tube with a replaceable plastic liner insert. The corer and its components are manufactured by the Kahlisico International Corporation, P.O. Box 947, El Cajon, CA 92022.

The second device employed in the Outer Bay was a Ponar grab dredge quantitative bottom dredge manufactured by the Wildlife Supply Company, Saginaw, MI 48602. The dredge which has a sampling area of 23 x 23 cm. (9" x 9"), utilizes it's weight, 28 kg (62 lbs), during descent to penetrate into the sediment. Upon retrieval, a simple tension release hinge levers the jaws of the dredge closed. Both devices were connected to the ship's winch by use of a shackle and 3/4 inch line. Each device was allowed to free fall to the bottom and returned to the deck by use of the ship's winch. The original intent was to use the corer with plastic inserts to estimate the relative depth of the redox boundary. However, this proved to be impractical since several of the samples collected showed no discernable redox boundary; as a consequence the corer was eliminated from the collections. A second problem arose with the use of the large Ponar, which repeatedly failed to close, necessitating repeated drops to obtain a sample. Various remedies were employed such as loosening all hinges, varying the rate of descent and by applying and releasing tension to the retrieval line. The failures appeared to be related to the depth of the water with a greater frequency of failure at the stations in deeper water. This suggested that the release hinge was always under tension and that the 3/4 inch line might be planning out during descent. Subsequent surveys conducted in the summer of 1986 seemed to confirm this when a shift was made to 1/2 inch nylon line. The nylon line was found to be much lighter and seemed to provide more spring upon retrieval resulting in a much lower rate of failure.

Sediments from the inner embayments, Areas I, II, III, were collected with Kahlisco's "petite ponar." This smaller version has a sampling area of 15

cm x 15 cm (6" x 6") and a weight of 10 kg (22 lbs). Collections were made from the Division's 17' "Boston Whaler", retrieval was by hand. Station location were verified by triangulation with various topographical features in the area after confirming the presence of silty, muddy sediments. The Division employed the following regimen during sample collections. Prior to each sample collection a member of the crew was responsible for preparing the Ponar dredge for sampling. The dredge was first washed in clean seawater to remove any adhering clumps of sediment. The interior of the dredge was then washed with reagent grade acetone followed by a rinse with reagent grade hexane, followed by a final rinse in clean seawater. The waste rinses were collected and transported back to the laboratory for disposal.

Upon retrieval of the dredge, it was opened and the contents placed in a galvanized steel wash tub. Glassware used in the sample collection were specifically purchased for that purpose or cleaned in a manner described in a TSB internal memorandum dated August 26, 1985 after consultation with the Lawrence Experimental Station (LES). Subsamples were taken in the following sequence, PCB's, PAH's, metals and grain size to minimize the possible cross contamination of the sediments with the metallic surfaces of the dredge. During the 1986 collections two samples were generally taken at each station. The sediments destined for organic analysis were scooped into the specially prepared jars which contained either a teflon or aluminum foil septum. Care was taken to minimize the collection of sediments in direct contact with the wash tub. Each sample was then tagged and placed in an ice cooler for subsequent transport to the laboratory. Sediments collected from the inner embayments during the FY86 sampling period were split for organic analysis. Samples destined for grain size analysis were kept frozen until analysis. For more specific information regarding field and analytical protocols refer to Tables 14 and 15 and/or contact the Massachusetts Division of Water Pollution Control's Technical Services Branch.

Particle Size Analysis:

The particle size analysis was conducted according to the "pipet method" as described in a draft document entitled "Protocols for Sampling Surficial Sediments for Physical/Chemical Variables." This was later supplemented with procedures found in the USGS publication "National Handbook of Recommended Methods for Water Data Acquisition", revision 4/79.

Sediments collected in the field were tagged, placed in an ice filled cooler and transported back to the Technical Services Laboratory where they were kept frozen pending the grain size determinations.

After thawing, the sample was mechanically homogenized by mixing. A wet weight sub-sample of approximately 40-50 grams was removed and placed in a 2 liter beaker. Replicate grain-size analysis was conducted on every fifth sample. Since it was desired to obtain the true particle size distribution, the sample was treated with the prescribed 20 ml of 10% hydrogen peroxide (H_2O_2) solution to digest any organic matter. The resulting reaction was found to be too slow and the procedure modified to use 10 ml. Increments of 30% H_2O_2 (Fisher Certified ACS) to speed up the digestion process. Approximately 100 mls of 30% H_2O_2 and 24 hours of digestion time per sample were required to completely digest all the organic matter. The

sample was then boiled for several minutes to drive off any excess hydrogen peroxide solution.

The sample was separated into coarse and fine fractions by wet sieving through a 63-micron stailess steel sieve. The sieving process continued with successive washes of dionized distilled water until clear water passed through the sieve. The coarse fraction retained by the sieve was transferred to a 250 ml beaker and dried in an oven at a temperature of 50° centigrade. The dried fraction was finally transferred to a dessicator for cooling.

The contents were then dried in an oven maintained at 105° centrigrade until all the moisture was driven off.

Coarse Fraction:

The coarse fraction was subsequently disaggregated using a mortar and pestle transferred to a tared beaker and weighed to the nearest 0.1 mg on "Mettler H10 Analytical Balance" to obtain the total weight of the coarse fraction. A nest of U.S. standard sieves ordered from coarsest (2 mm. mesh) to finest (0.0625 mm. mesh) was then assembled with a pan located on the bottom. The coarse fraction was placed in the top sieve and the whole nest shaken for 15 minutes on a mechanical shaker table. The contents of each sieve was emptied onto a sheet of aluminum foil. The sieve screens were lightly tapped and brushed with a nylon brush to dislodge any adhering particles. The entire contents of each sieve was transferred from the aluminum sheet to a tared beaker where upon the individual size fractions were weighed to the nearest 0.1 mg. Additional material passing through the finest screen was added to the beaker containing the fine fraction.

Fine Fraction:

The fine fraction from the initial sieving was allowed to stand until the silts and clays settled out. The clear supernatant water was removed by siphoning. The fine fraction was transferred to a metal cup of a malt blender and 10 ml of a 1% solution of Calgon added to the mixture. The Calgon solution acted as a peptizer to prevent flocculation of the sediment particles. The mixture was blended for three minutes, transferred to a 1,000 ml graduated cylinder and brought up to a volume of approximately 900 mls with dionized distilled water. The mixture was allowed to stand for three hours and observed for signs of flocculation. If a definite band of clear water developed an additional amount of Calgon solution was added to the mixture. The volume of Calgon solution was recorded for future calculations. The sediment suspension was diluted to 1,000 mls by addition of dionized distilled water. The sample was thoroughly mixed with a long stirring rod and a 20 ml sample withdrawn from a depth of 20 cm to determine its wet weight. This was placed in a tarred 50 ml beaker, the pipet was washed with dionized distilled water and the rinse added to the beaker. The contents were then dried in an oven maintained at 105° centigrade until all the moisture was driven off. The contents were allowed to cool in a dessicator before being weighed to the nearest 0.1 ml to obtain an estimate of the total weight of fine fraction. The graduated cylinder was placed in a constant temperature bath, clamped in place for stability and brought up to the 1,000 ml mark with dionized distilled water. The sample was then thoroughly stirred to insure that the sediments were uniformly mixed

throughout the water column. Fifteen seconds after cessation of the stirring 20 mls of solution was withdrawn from a depth of 20 cm. This was placed in a tared 50 ml beaker, the pipet washed with dionized distilled water and the rinse added to the beaker.

The contents were allowed to cool in a dessicator before being weighed to the nearest 0.1 mg. Subsequent timed withdrawals were made in accordance with specified directions with the last withdrawal being made for PHI sizes 8.0 or less. All of the tared 50 ml beakers were then transferred to an oven maintained at 105° centigrade until all the moisture was driven off. The fractions were then allowed to cool and weighed to the nearest 0.1 mg.

Calculations:

The data for both the coarse fraction and the fine fraction were recorded in tabular form in a bound notebook. The weights of the samples withdrawn during the pipet analysis were cumulative while those of the dry sieving were not. Corrections for the amount of peptizer were included in the calculations. The total sample weight was to be calculated from the weight of the fine fraction and the coarse fraction.

Upon completion of the methods detailed above and during the calculation phase it became apparent that the methodology contained several omissions and sources of error. Verification came from the methodology described in the forementioned "National Handbook of Recommended Methods for Water Data Acquisition" revision 4/79. the draft procedure made no provision for obtaining a dry weight of the subsample after treatment with the hydrogen peroxide. Therefore, there was no true measure of the total weight of the sample. The draft procedure also called for the addition of the Calgon dispersent to the fine fraction, whereas, the handbook calls for its addition prior to separation into the coarse and fine fractions. The initial withdrawal to obtain an estimate of total fines was consistently smaller than the next withdrawal indicating some loss of fines. Accordingly, the reported grain size analysis underestimates the percentage of fines and the relative proportions of fine fractions. Particle size is reported in the following tables by "PHI size" as recommended by the subcommittee on sediment terminology of the American Geophysical Union by Lane (1947).

CLASS NAME	MILLIMETERS	MICROMETERS	PHI VALUE
Boulders	>256	--	<-8
Cobbles	256-64	--	-8 to -6
Gravel	64-2	--	-6 to -1
Very coarse sand	2.0-1.0	2,000-1,000	-1 to 0
Coarse sand	1.0-0.50	1,000-500	0 to +1
Medium sand	0.50-0.25	500-250	+1 to +2
Fine sand	0.25-0.125	250-125	+2 to +3
Very fine sand	0.125-0.062	125-62	+3 to +4
Coarse silt	0.062-0.031	62-31	+4 to +5
Medium silt	0.031-0.016	31-16	+5 to +6
Fine silt	0.016-0.008	16-8	+6 to +7
Very fine silt	0.008-0.004	8-4	+7 to +8

CLASS NAME	MILLIMETERS	MICROMETERS	PHI VALUE
Coarse clay	0.004-0.0020	4-2	+8 to +9
Medium clay	0.0020-0.0010	2-1	+9 to +10
Fine clay	0.0010-0.0005	1-0.5	+10 to +11
Very fine clay	0.0005-0.00024	0.5-0.24	+11 to +12
Colloids	<0.00024	<0.24	>+12

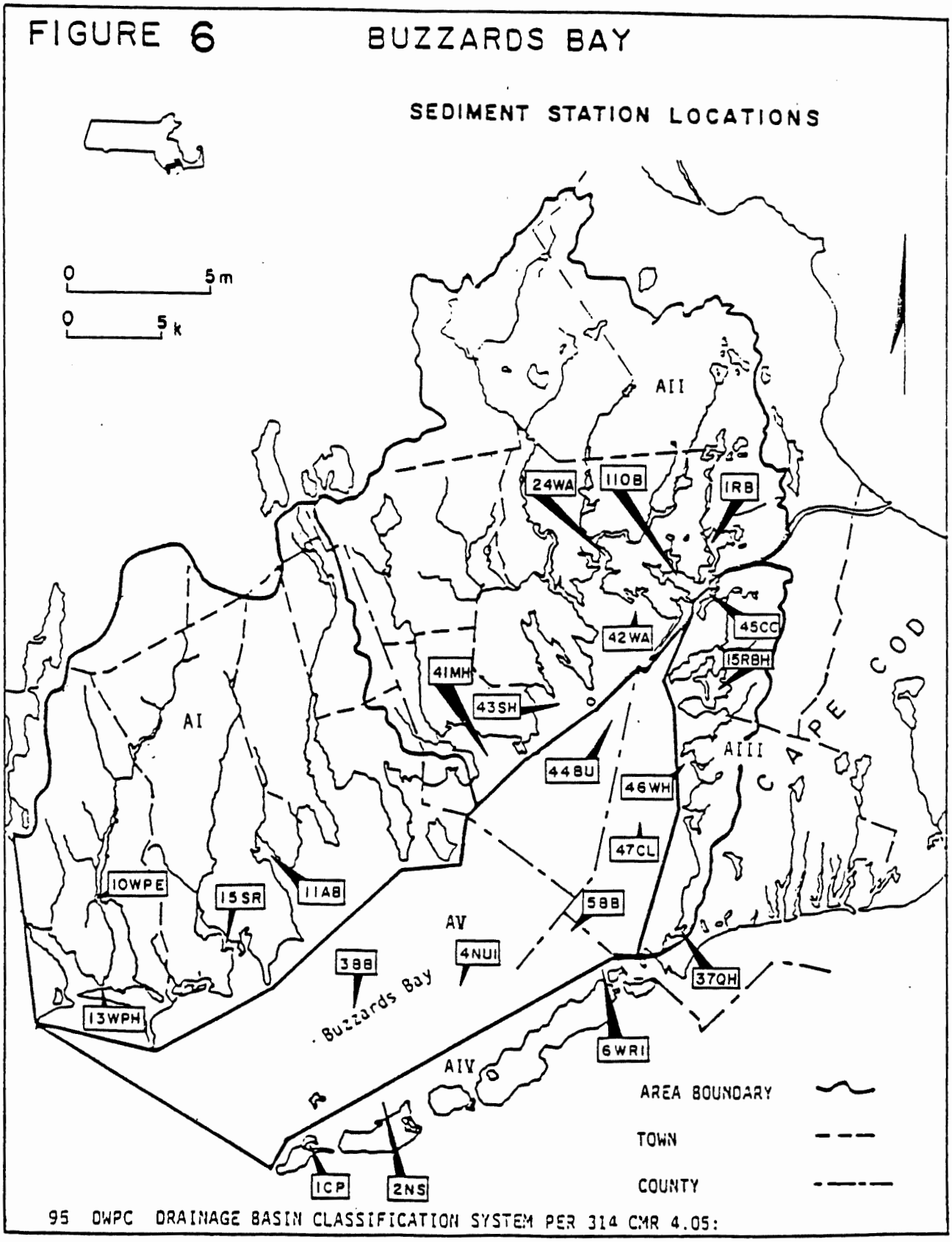
Priority Pollutants Sediment Analysis:

All field samples were immediately placed on ice at the time of collection and remained so until they were received by the Lawrence Experiment Station (LES). All samples were received by LES within two days of collection, generally within 24 hours. TSB collected a total of 29 samples from 22 stations during the course of this project. Table 7 provides a comparative list of sampling parameters by area. Upon receipt by the laboratory the samples were logged and processed according to approved EPA procedures. Analysis was conducted by direct aspiration atomic absorption spectroscopy. In direct aspiration atomic absorption spectroscopy a sample is aspirated and atomized in a flame. A light beam from a hollow cathode lamp whose cathode is made of the element to be determined is directed through the flame into a monochromator, and onto a detector that measures the amount of light absorbed. Absorption depends upon the presence of free unexcited ground state atoms in the flame. Since the wavelength of the light is characteristic of only the metal being determined, the light energy absorbed by the flame is a measure of the concentration of that metal in the sample. Preliminary treatment of solids by atomic absorption is complicated by the complexity and variability of the sample matrix. This process varies with the metal to be determined and the nature of the sample to be analyzed. When the breakdown of organic material is necessitated, the process included a wet digestion procedure. A list of the procedures used is found as Table 15 of this report. The reference section of this report provides additional information concerning analytical procedures, sample preparation and quality assurance/quality control.

Prior to 5/23/86 LES used a Perkin Elmer 403 spectrophometer to analyze for metals. It did not have a background correction factor to filter out "background noise" caused by the matrix of the material being analyzed, thereby resulting in artificially high levels. The analytical QA/QC procedures used by LES did not and could not reflect that interference. Sediment samples delivered to LES after 5/23/86 were analyzed with a Varian AA01275 spectrophotometer which did have the necessary background correction factor and are so noted in Table 8.

Gas chromatography was used to analyze for polychlorinated biphenyls according to the EPA soxhlett extraction procedure for sediments (U.S. EPA, October 1980). Confirmation was made by running the sample through a second column. Quantification was made by comparing sample results with known standards of Aroclors 1242, 1248, 1254 and 1260. Polycyclic aromatic hydrocarbons were analyzed by gas chromatography/mass spectrometry according to procedures described in U.S. EPA methods 3510 and 8100. Table 15 lists all analytical procedurews employed as well as minimum detection limits. For more specific information regarding extraction procedures, laboratory QA/QC employed by LES contact the TSB office in Westborough, Massachusetts or the Lawrence Experiment Station, Lawrence, Massachusetts.

FIGURE 6 BUZZARDS BAY



95 DWPC DRAINAGE BASIN CLASSIFICATION SYSTEM PER 314 CMR 4.05:

TABLE 5

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

STATION LOCATIONS - AREAS I-III

STATION NUMBER	LOCATION DESCRIPTOR	LATITUDE	LONGITUDE	DATE SAMPLED
	Area I			
10WPE13	Westport River East Branch at Hix Bridge, Westport	41°34'13"N	71°04'19"W	6/23/86
13WPH16	Westport Harbor, Main Channel at Can #25, Westport	41°30'51"N	71°04'14"W	6/23/86
11AB10	Apponagansett Bay, north of Padanarum Dartmouth	41°35'14"N	70°55'58"W	7/24/86
15SR20	Slocum River at Gaffney Road Landing, Dartmouth	41°32'45"N	71°00'03"W	7/24/86
	Area II			
41MH0800	Mouth of Mattapoisett Harbor at Nun #4, Mattapoisett	41°38'15"N	70°47'25"W	7/16/86
24WA0180	Wareham River at Crab Cove, Wareham	41°44'57"N	70°42'07"W	7/16/86
110B0200	Onset Bay, Basin between Wickets Island and Onset Island, Wareham	41°44'10"N	70°38'34"W	7/16/86
1RB010	Red Brook, at mouth of Red Brook, Wareham/Bourne town line	41°45'48"N	70°37'59"W	10/23/86
	Area III			
15RBH030	Red Brook Harbor at Can #13, Bourne	41°40'30"N	70°37'24"W	10/23/86
37QH030	Center Harbor at Can #7, Falmouth	41°32'24"N	70°39'39"W	10/09/86

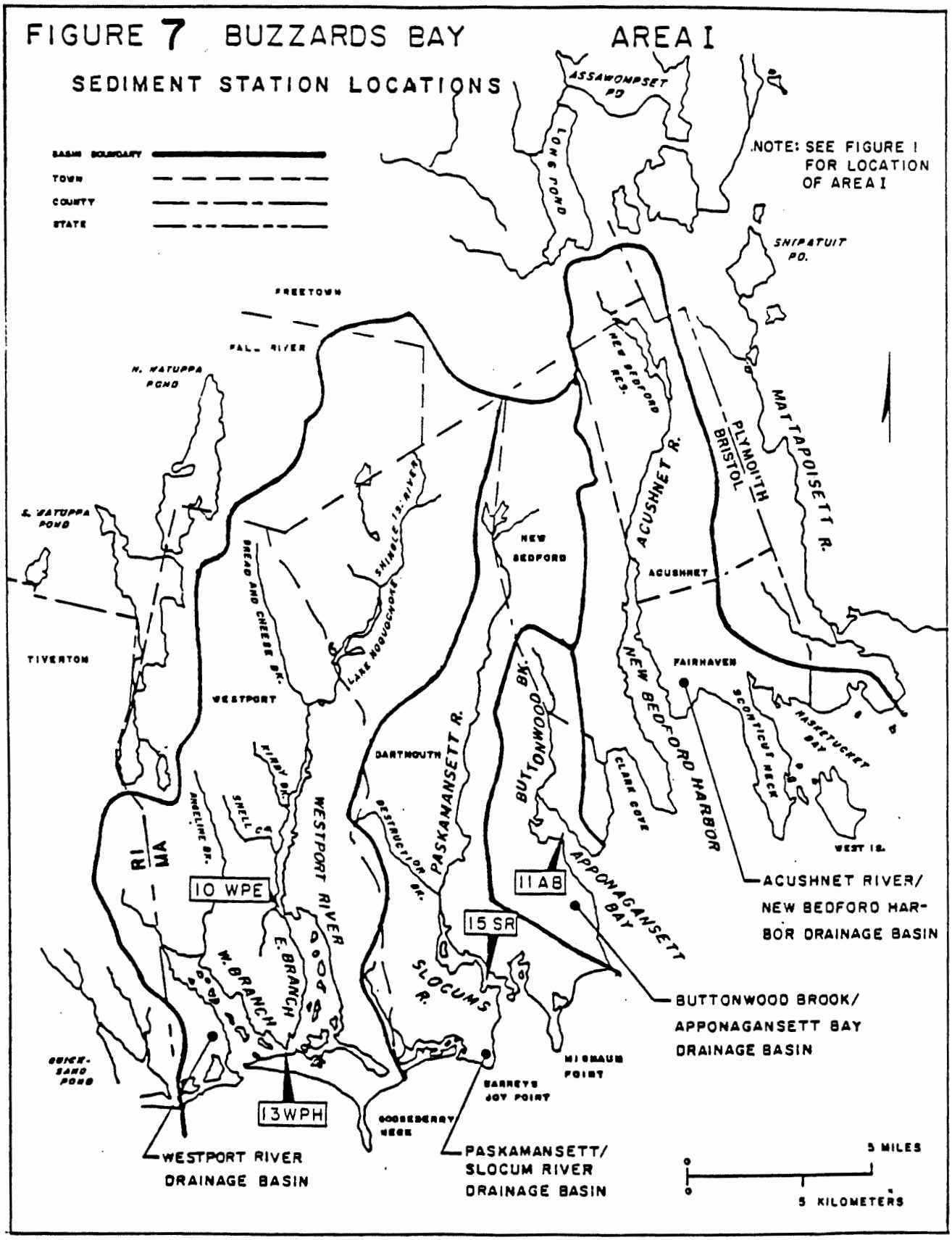


FIGURE 7 BUZZARDS BAY AREA I
SEDIMENT STATION LOCATIONS
BASIN BOUNDARY
TOWN
COUNTY
STATE
NOTE: SEE FIGURE I FOR LOCATION OF AREA I
ASSAWOMPSET PD
LONG POND
SNIPATUIT PD.
FREETOWN
FALL RIVER
N. WATUPPA POND
S. WATUPPA POND
TIVERTON
WESTPORT
BREAD AND CHEESE BK.
SHINGLE IS. RIVER
LAKE NOQUOCHOKE
NEW BEDFORD
NEW BEDFORD RES.
ACUSHNET R.
PLYMOUTH
BRISTOL
MATTAPOISETT R.
ACUSHNET
FAIRHAVEN
NEW BEDFORD HARBOR
SCONTICUT NECK
BUTTONWOOD BK.
DARTMOUTH
PASKAMANSETT R.
DESTRUCTION BR.
CLARK COVE
APPONAGANSETT BAY
WEST IS.
RI
MA
ANGELINE BR.
SHELL C.
KIRBY BR.
WESTPORT RIVER
E. BRANCH
W. BRANCH
10 WPE
11 AB
15 SR
13 WPH
SLOCUMS R.
QUICK-SAND POND
GOOSEBERRY NECK
BARNEYS JOY POINT
MISHAUM POINT
ACUSHNET RIVER/ NEW BEDFORD HARBOR DRAINAGE BASIN
BUTTONWOOD BROOK/ APPONAGANSETT BAY DRAINAGE BASIN
WESTPORT RIVER DRAINAGE BASIN
PASKAMANSETT/ SLOCUM RIVER DRAINAGE BASIN
5 MILES
5 KILOMETERS

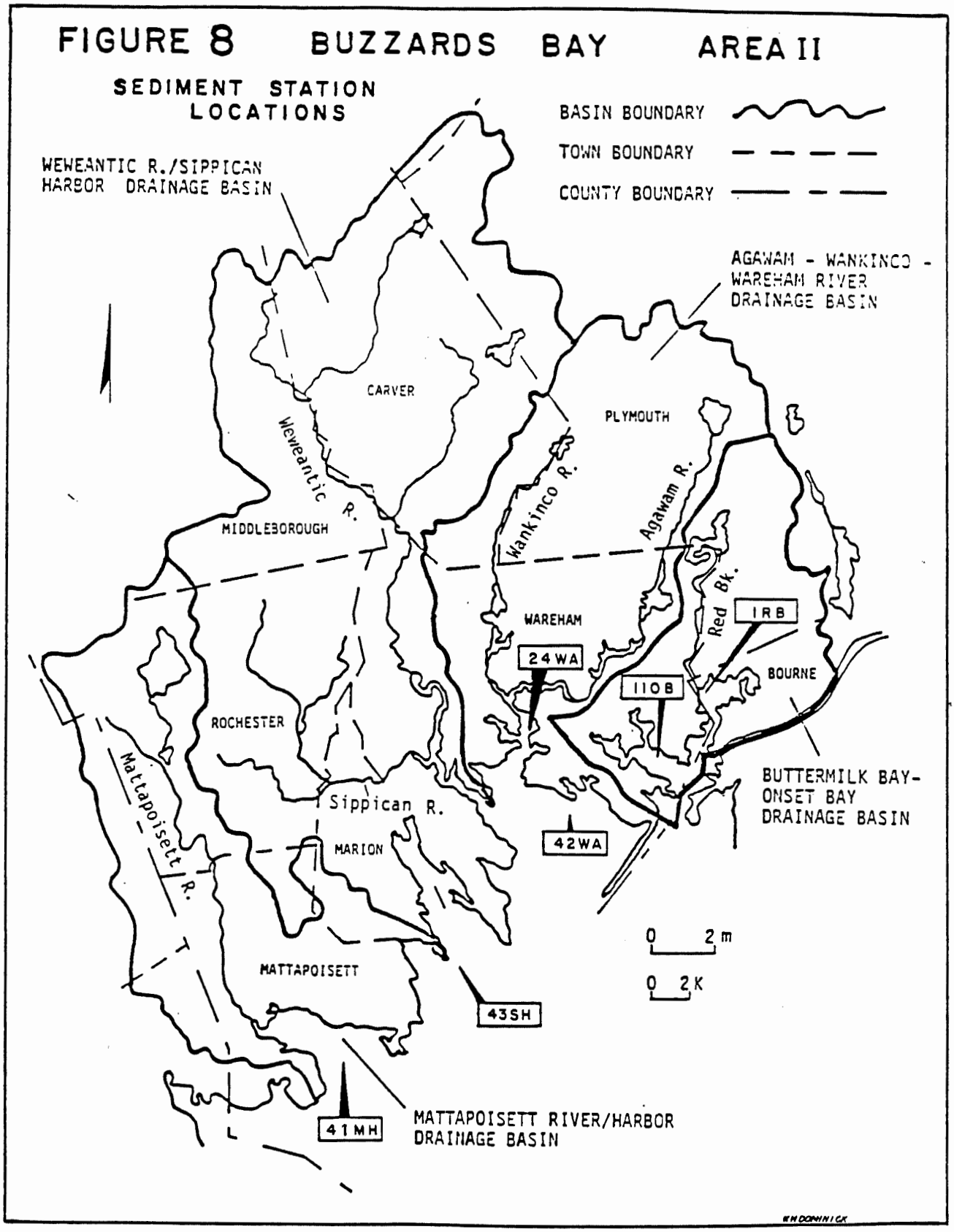


FIGURE 8 BUZZARDS BAY AREA II
SEDIMENT STATION LOCATIONS
BASIN BOUNDARY
TOWN BOUNDARY
COUNTY BOUNDARY
WEWEANTIC R./SIPPICAN HARBOR DRAINAGE BASIN
AGAWAM - WANKINCO - WAREHAM RIVER DRAINAGE BASIN
CARVER
PLYMOUTH
Weweantic R.
Wankinco R.
Agawam R.
MIDDLEBOROUGH
WAREHAM
Red Bk.
IRB
24WA
110B
BOURNE
ROCHESTER
Mattapoisett R.
Sippican R.
MARION
42WA
BUTTERMILK BAY-ONSET BAY DRAINAGE BASIN
0 2 m
0 2K
MATTAPOISETT
43SH
41MH
MATTAPOISETT RIVER/HARBOR DRAINAGE BASIN
W.H. DOMNICK

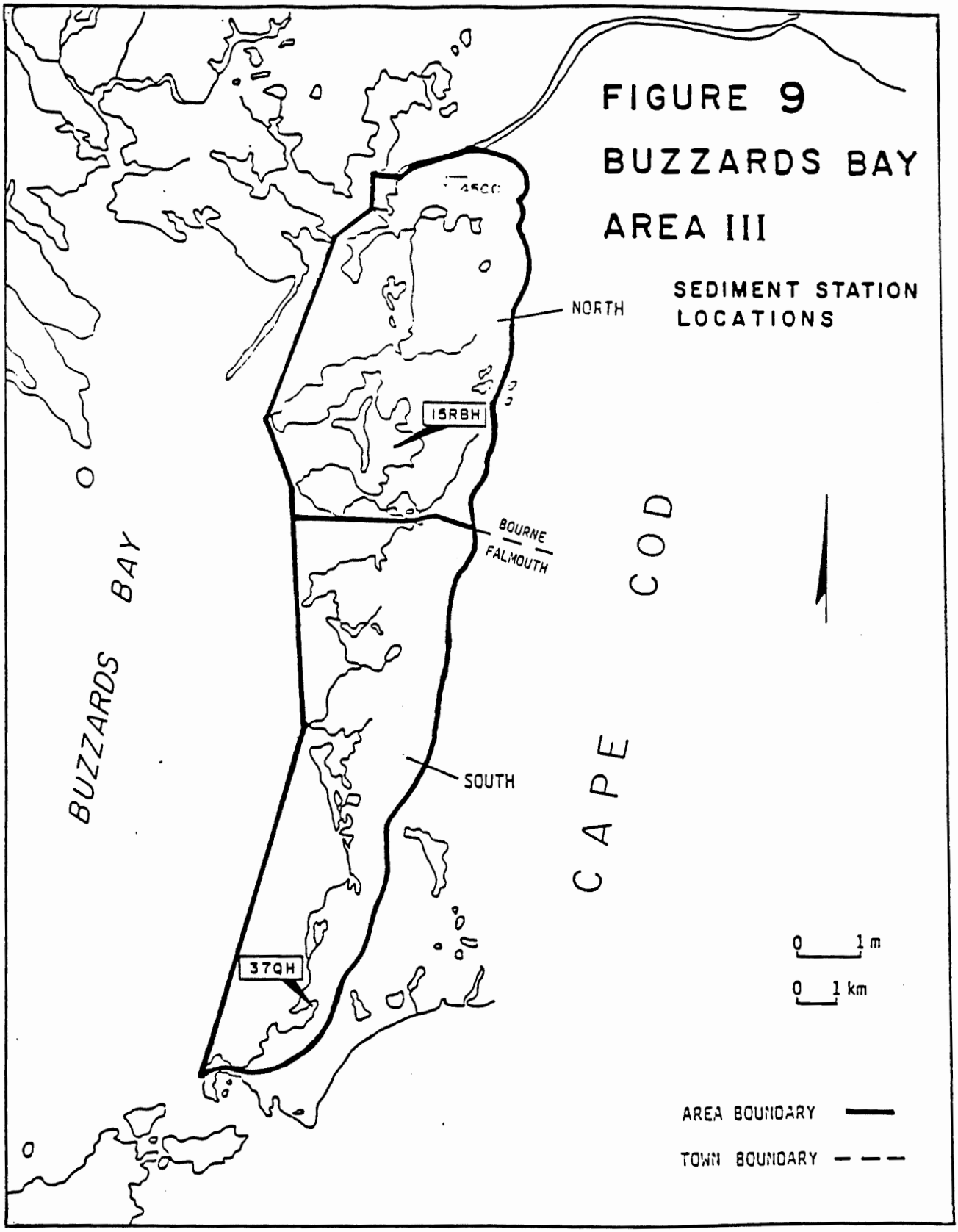


FIGURE 9
BUZZARDS BAY
AREA III
SEDIMENT STATION
LOCATIONS
NORTH
15RBH
BOURNE
FALMOUTH
SOUTH
37QH
BUZZARDS BAY
CAPE COD
0 1 m
0 1 km
AREA BOUNDARY
TOWN BOUNDARY

TABLE 6

1985-1986 BUZZARDS BAY SEDIMENT SURVEY STATIONS

STATION LOCATIONS - AREAS IV-V

STATION NUMBER	LOCATION DESCRIPTOR	LATITUDE	LONGITUDE	LORAN-C	DATE SAMPLED
		Area IV			
1CP10	Cuttyhunk Pond Center Harbor, Gosnold	41°25'50"N	70°56'69"W	14250.1/25543.0.0	10/18/86
6WPI10	Weepecket Island betweeen Weepecket and Uncatena Island, Gosnold	41°30'83"N	70°43'48"	14155.8/25455.8	8/26/86
		Area V			
2NSI10	Nashawena Island west of #7 bell, Gosnold	41°27'34"N	70°53'54"W	14231.6/25529.0	10/28/86
3BB10	Outer Bay east of R8 gong. Approximate Station O (Sanders)[1], Gosnold	41°29'13"N	70°52'52"W	14215.0/25527.4	10/28/86
4NUI10	Naushon Island off Kettle Cove. Approximate Station 9 (New England Aquarium)[2], Gosnold	41°30'14"N	70°49'60"W	14195.2/25505.9	8/26/86 10/28/86
5BB20	Buzzards Bay halfway between navigational markers BW'/WI', Gosnold	41°32'77"N	70°43'02"W	14145.0/25460.0	8/26/86
42WA0400	Wareham River south of Indian Neck, Wareham	41°42'N	70°42'W	14100/2548	8/13/85
43SH0500	Sippican Harbor south of Converse Point, Marion	41°40'N	70°44'W	14122/25507	8/13/86
44BU0300	Anchorage C, Marion	41°40'N	70°41'W	14103.9/25484.0	8/13/85
45CC01	Cape Cod Canal berthing basin, Bourne	41°44'19"N	70°38'21"W	14066.4/25474.8	8/28/85
46WH008	Wild Harbor outside 30 ft. contour, Falmouth	41°38'10"N	70°39'02"W	14099.8/25454.6	8/28/85
47CL020	Clevelands Ledge, Falmouth	41°35'38"N	70°41'06"W	14125.5/25461.2	8/28/85

[1] See references
[2] See references

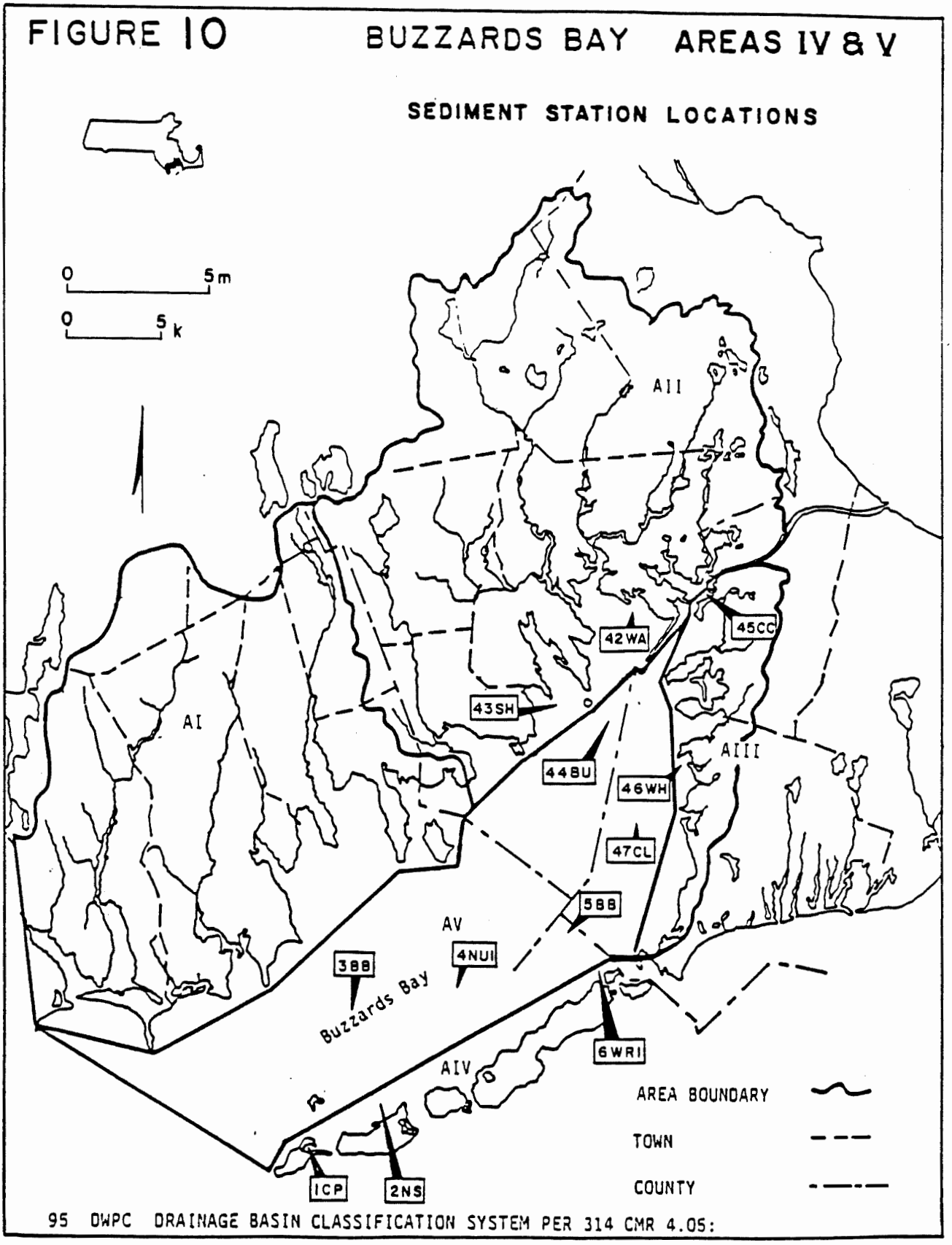


FIGURE 10
BUZZARDS BAY AREAS IV & V
SEDIMENT STATION LOCATIONS
0 5m
0 5 k
AI
AII
AIII
AIV
AV
42WA
45CC
43SH
44BU
46WH
47CL
5BB
4NUI
3BB
6WRI
1CP
2NS
Buzzards Bay
AREA BOUNDARY
TOWN
COUNTY
95 DWPC DRAINAGE BASIN CLASSIFICATION SYSTEM PER 314 CMR 4.05:

TABLE 7

1985-1986 BUZZARDS BAY SEDIMENT QUALITY SURVEY

COMPARISON OF PARAMETERS MEASURED VS. AREA

	AREA				
PARAMETER	A1	A2	A3	A4	A5
Actual vs. Proposed Number of Stations (in preliminary survey)*	4-4	4-6	2-5	2-2	10-10
Overlying Water Quality **	4-4	4-4	2-2	2-2	10-10
Grain Size Analysis	4-4	4-4	2-2	2-2	10-10
Metals	4-4	3-4	2-2	1-2	9-10
Total (Silver)***	0-4	0-4	2-2	0-2	0-10
Total (Cadmium)***	4-4	0-4	2-2	1-2	9-10
Total Chromium	4-4	3-4	2-2	1-2	9-10
Total Copper	4-4	3-4	2-2	1-2	9-10
Total Mercury	4-4	3-4	2-2	1-2	9-10
Total Nickel	4-4	3-4	2-2	0-2	6-10
Total Lead	4-4	3-4	2-2	1-2	9-10
Total Zinc	0-4	3-4	2-2	0-2	0-10
Polychlorinated Biphenyls	4-4	4-4	2-2	2-2	10-10
Polycyclic Aromatic Hydrocarbons	4-4	4-4	2-2	1-2	10-10

* See FY85 and FY86 Work Plans

** See Buzzards Bay 1985 and 1986 Water Quality Survey Data Reports

*** Metals included in parenthesis represent those not included in the original proposal

TABLE 8

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

HEAVY METALS (mg/kg dry wt.)

AREAS I-V

STATION	TOTAL CADMIUM	TOTAL CHROMIUM	TOTAL COPPER	TOTAL LEAD	TOTAL MERCURY	TOTAL NICKEL
			Area 1			
10WPE13	2.0	10	8.0	9.0	0.095	12
13WPH16	1.0	6.5	21	24	0.070	7.5
11AB10 (1)	<1.0	17	22	14	0.1	7.0
11AB10 (2)	1.5	30	50	44	0.15	13
15SR20 (1)	4.0	22	17	26	0.1	10
15SR20 (2)	4.0	24	21	18	0.1	14
			Area II			
41MH0800 (1)	*	4.0	9.5	21	2.6	3.0
41MH0800 (2)	*	11	14	21	0.36	4.5
24WA0180 (1)	*	16	24	34	0.95	4.5
24WA0180 (2)	*	10	14	30	0.23	2.5
11OB0200 (1)	*	21	20	28	0.17	9.0
11OB0200 (2)	*	26	27	44	0.16	12
1RB010			S a m p l e l o s t			
			Area III			
15RBH030 (1)	1.2	22	30	29	0.112	8.8
15RBH030 (2)	<0.8	3.6	4.4	12	0.040	<2.0
37QH030 (1)	1.6	28	92	72	2.112	16
37QH030 (2)	1.6	28	88	64	1.576	16
			Area IV			
1CP10 (1)	<0.80	22	52	52	0.368	*
1CP10 (2)	<0.80	20	48	44	0.480	*
6WPI10			S a m p l e l o s t			

TABLE 8 (CONTINUED)

STATION	TOTAL CADMIUM	TOTAL CHROMIUM	TOTAL COPPER	TOTAL LEAD	TOTAL MERCURY	TOTAL NICKEL
			Area V			
2NSI10 (1)	<0.80	20	11	19	0.128	*
2NSI10 (2)	<0.80	21	9.6	20	0.112	*
3BB10 (1)	<0.80	19	8.4	18	0.112	*
3BB10 (2)	<0.80	21	9.6	20	0.112	*
4NUI10	<0.80	8.0	4.0	5.2	0.096	*
5BB20		Sample lost				
42WA0400**	<1.0	8.5	4.5	8.0	0.05	4.5
43SH0500**	<1.0	9.0	9.0	15	0.10	6.0
44BU0300**	<1.0	13	12	14	0.10	7.0
45CC01**	<1.0	2.5	1.0	5.5	<0.01	2.5
46WH008**	<1.0	2.5	5.0	9.5	0.03	4.0
47CL020**	<1.0	7.0	9.0	12	0.05	8.5

* No data

** Analyzed on Perkin Elmer 403 spectrophotometer. All others on a Varian AA-1275.

Numbers in parentheses are numbers of samples at that station

TABLE 9

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

PCB/AROCLOR (ug/g) AND PAH (ug/g) DRY WEIGHT

AREAS I-V

STATION	1016/ 1242	1248	1254	1260	PAH(1)
		Area I			
10WPE13 (1)	ND	ND	ND	ND	ND
10WPE13 (2)	ND	ND	ND	ND	ND
13WPH16 (1)	ND	ND	ND	ND	ND
13WPH16 (2)	ND	ND	ND	ND	ND
11AB10 (1)	0.29	ND	ND	ND	ND
11AB10 (2)	0.25	ND	ND	ND	ND
15SR20 (1)	ND	ND	ND	ND	ND
15SR20 (2)	ND	ND	ND	ND	ND
		Area II			
41MH0800 (1)	ND	ND	ND	ND	ND
41MH0800 (2)	ND	ND	ND	ND	ND
24WA0180 (1)	ND	ND	ND	ND	ND
24WA0180 (2)	ND	ND	ND	ND	ND
110B0200 (1)	ND	ND	ND	ND	ND
110B0200 (2)	ND	ND	0.89	ND	ND
1RB010	ND	ND	ND	ND	1-0.15 3-0.33 4-0.22
		Area III			
15RBH030	ND	ND	ND	ND	3-0.32 4-0.21
37QH030	<0.56	ND	ND	ND	1-0.20 3-0.51 4-0.38
		Area IV			
1CP10	ND	<0.16	<0.56	ND	1-0.18 3-0.34 4-0.22
6WPI10	ND	ND	ND	ND	NA

TABLE 9 (CONTINUED)

STATION	1242/ 1016	1248	1254	1260	PAH(1)
		Area V			
2NSI10	ND	<0.16	<0.56	ND	1-0.51 2-0.35 3-0.64 4-0.43 5-0.25
3BB10	ND	ND	ND	ND	ND
4NUI10	ND	ND	<0.56	ND	ND
5BB20	ND	ND	ND	ND	ND
42WA0400	ND	ND	ND	ND	ND
43SH0500	ND	ND	<0.56	ND	ND
44BU0300	ND	ND	ND	ND	ND
45CC01	ND	ND	ND	ND	ND
46WH008	ND	ND	ND	ND	ND
47CL020	ND	ND	<0.56	ND	ND

Code - PAH 1 = Phenanthrene
2 = Anthracene
3 = Fluoranthene
4 = Pyrene
5 = Benzo(a)anthracene

ND = Not Detected

(1) No standard available for quantitation. The mass spectrum obtained was compared to a mass spectral data base for identification.

Values reported as less than (<) indicate that the parameter was detected but at concentrations too low for quantification.

TABLE 10

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

PARTICLE SIZE ANALYSIS PERCENT COARSE AND FINE FRACTION

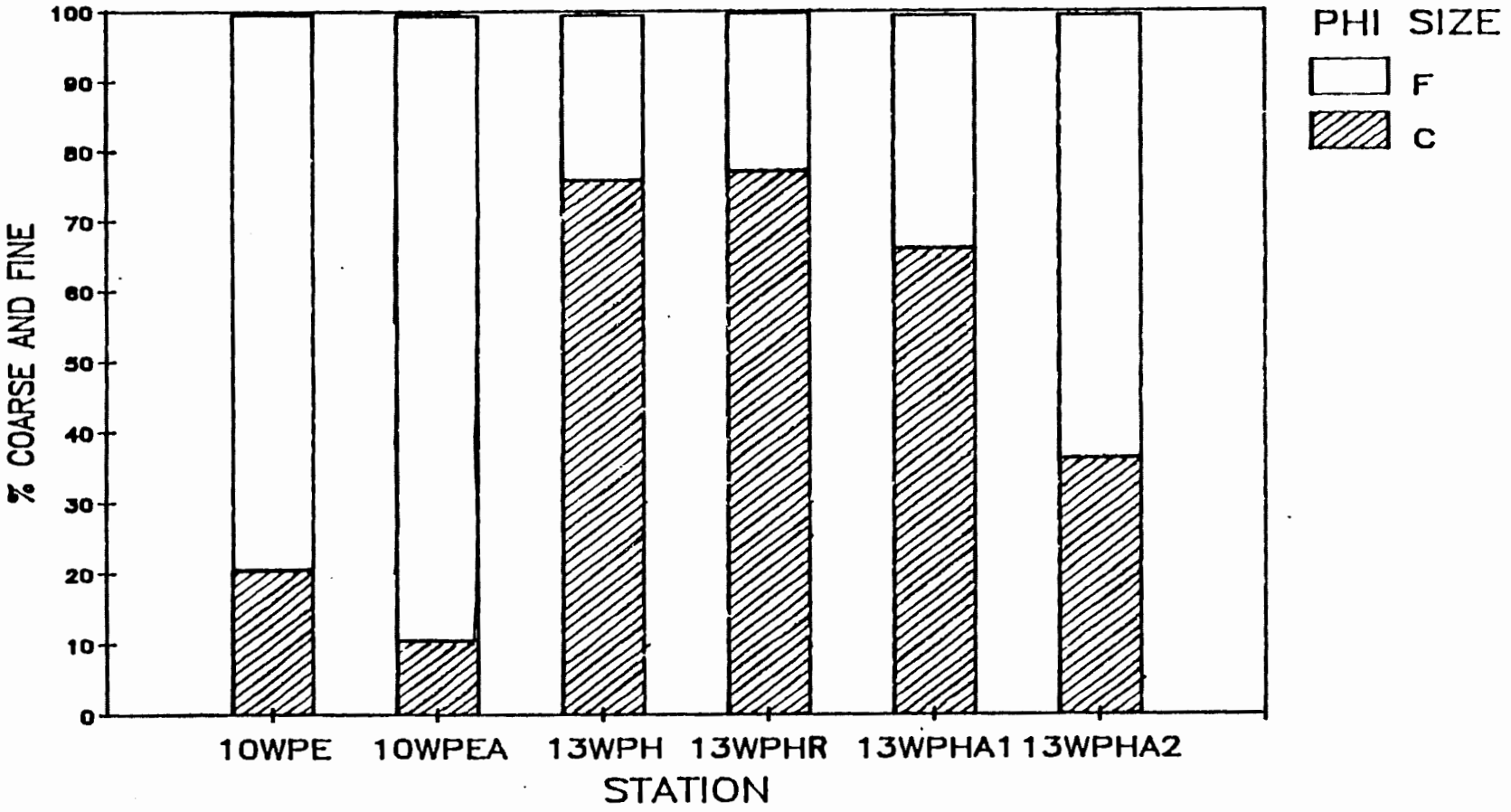
STATION	PERCENT FINE	PERCENT COARSE
Area I		
10WPE13 (1)	79.06	20.54
10WPE13A (2)	88.75	10.54
13WPH16 (1)	23.61	75.83
13WPH16 R	22.55	77.15
13WPH16A (2)	33.27	66.06
11AB10 (1)	50.86	48.84
11AB10 (2)	66.82	31.58
15SR20 (1)	90.06	9.84
15SR20 (2)	80.68	19.27
Area II		
41MH0800 (1)	49.50	49.82
41MH0800 (2)	30.10	69.34
41MH0800 (2) R	28.07	71.71
24WA0180 (1)	61.13	38.22
24WA0180 (2)	40.10	59.54
110B0200 (1)	66.01	33.73
110B0200 (1) R	66.21	33.54
110B0200 (2)	85.44	14.25
1RB010A (1)	26.78	73.08
1RB010B (2)	14.07	85.56
Area III		
15RBH030A (1)	93.22	6.10
15RBH030B (2)	70.81	28.57
37QH030A (1)	95.19	4.43
37QH030A R	93.34	6.12
37QH030B (2)	93.52	6.05
Area IV		
1CP10	63.64	39.96
6WPI10 (1)	44.57	55.27
6WPI10 (2) R	43.27	56.57

TABLE 10 (CONTINUED)

STATION	PERCENT FINE	PERCENT COARSE
	Area V	
2NSI10	82.74	16.61
3BB10 (1)	75.48	24.27
3BB10 (2)	76.18	23.64
4NUI10	31.24	68.70
5BB20	85.23	14.62
42WA0400	19.25	80.69
43SH0500	24.30	75.57
44BU0300	24.63	75.13
45CC01	11.35	88.50
45CC01 R	13.50	86.39
46WH008	5.85	93.93
46WH008 R	10.62	89.27
47CL020	23.99	75.60

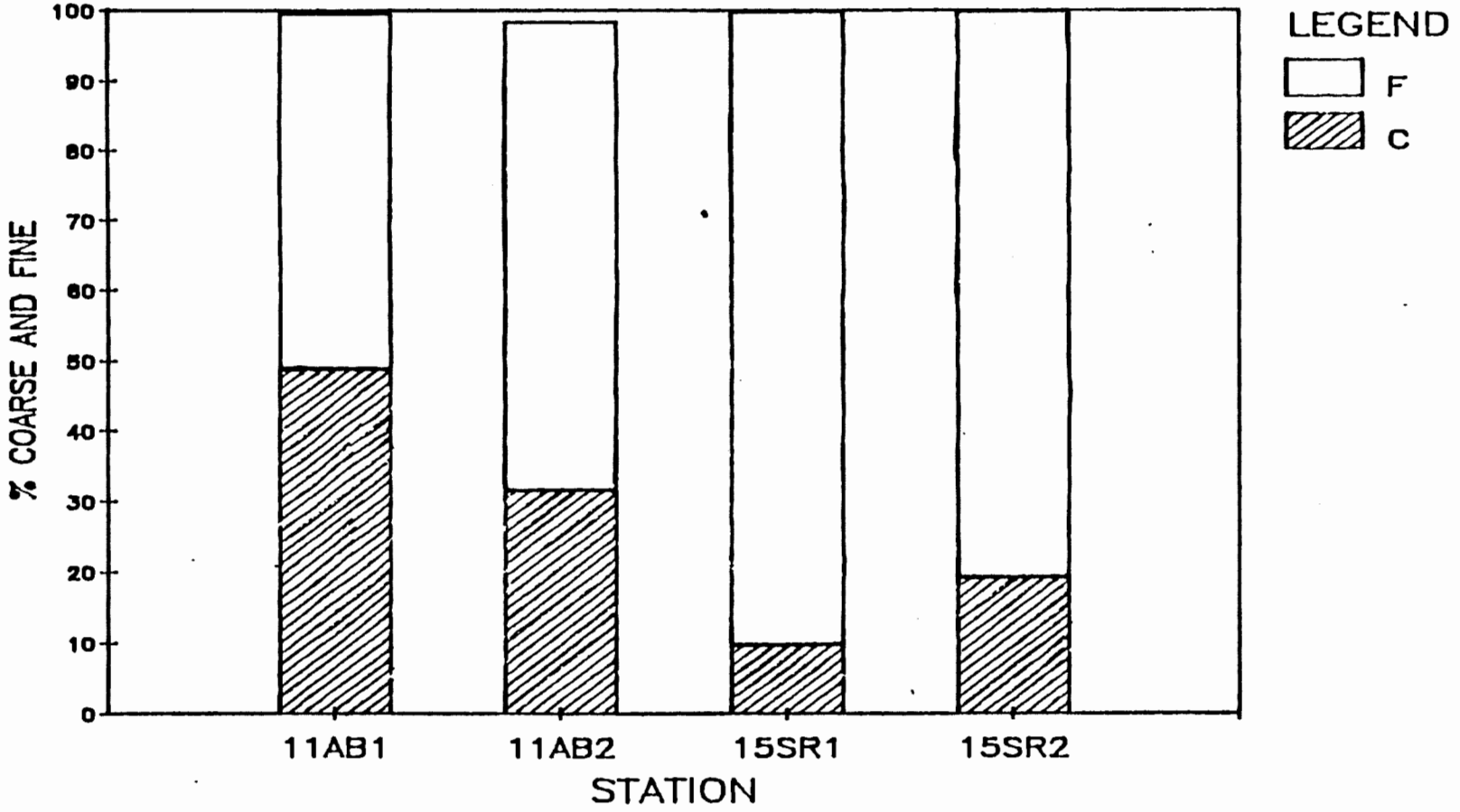
R = replicate grain size analysis
(1)= First sample
(2)= Second sample

FIGURE 11
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA I
WESTPORT RIVER



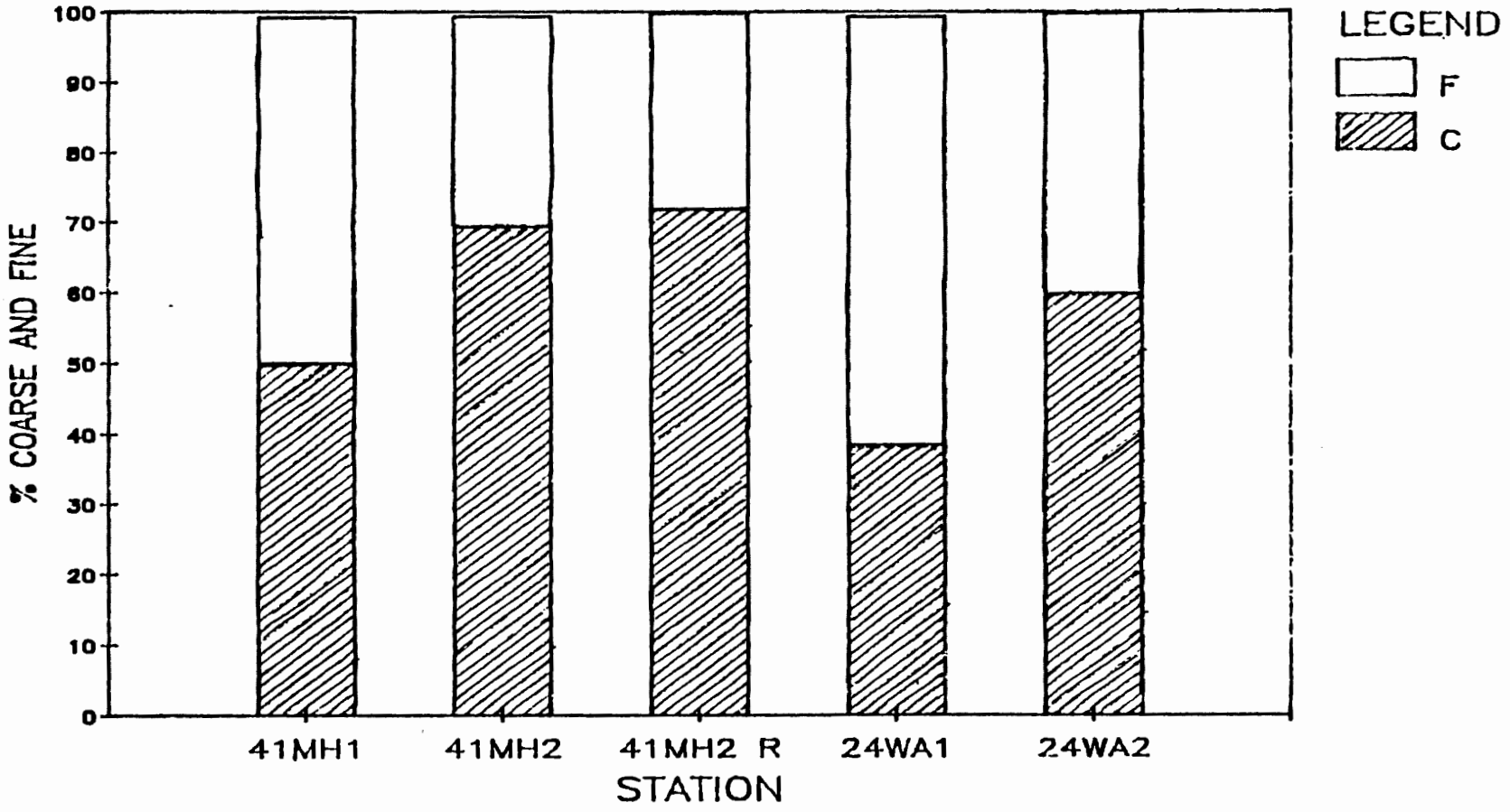
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 12
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA 1
APPONAGANSETT BAY / SLOCUM RIVER



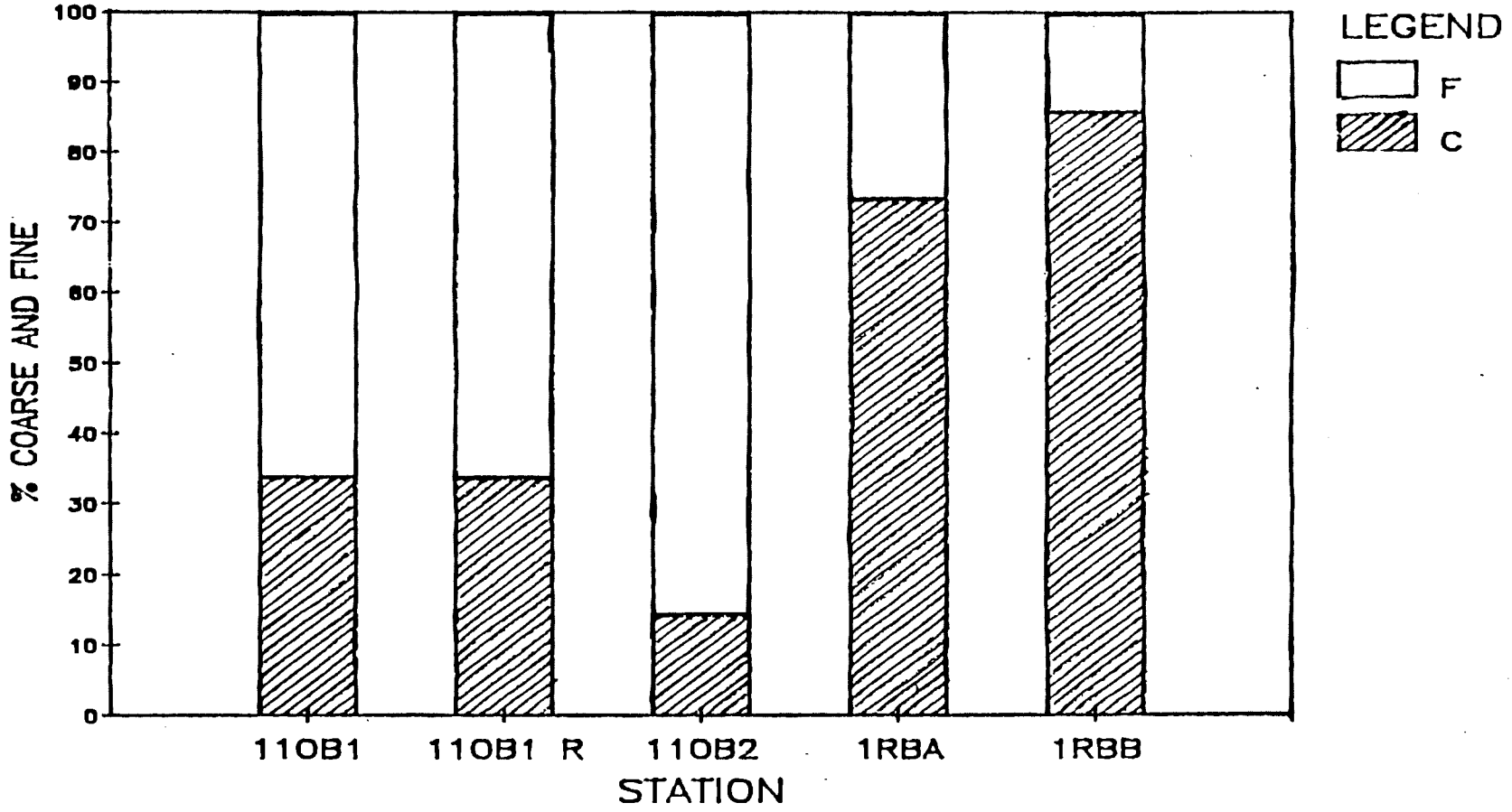
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 13
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA II
MATTAPOISETT HARBOR / WAREHAM RIVER



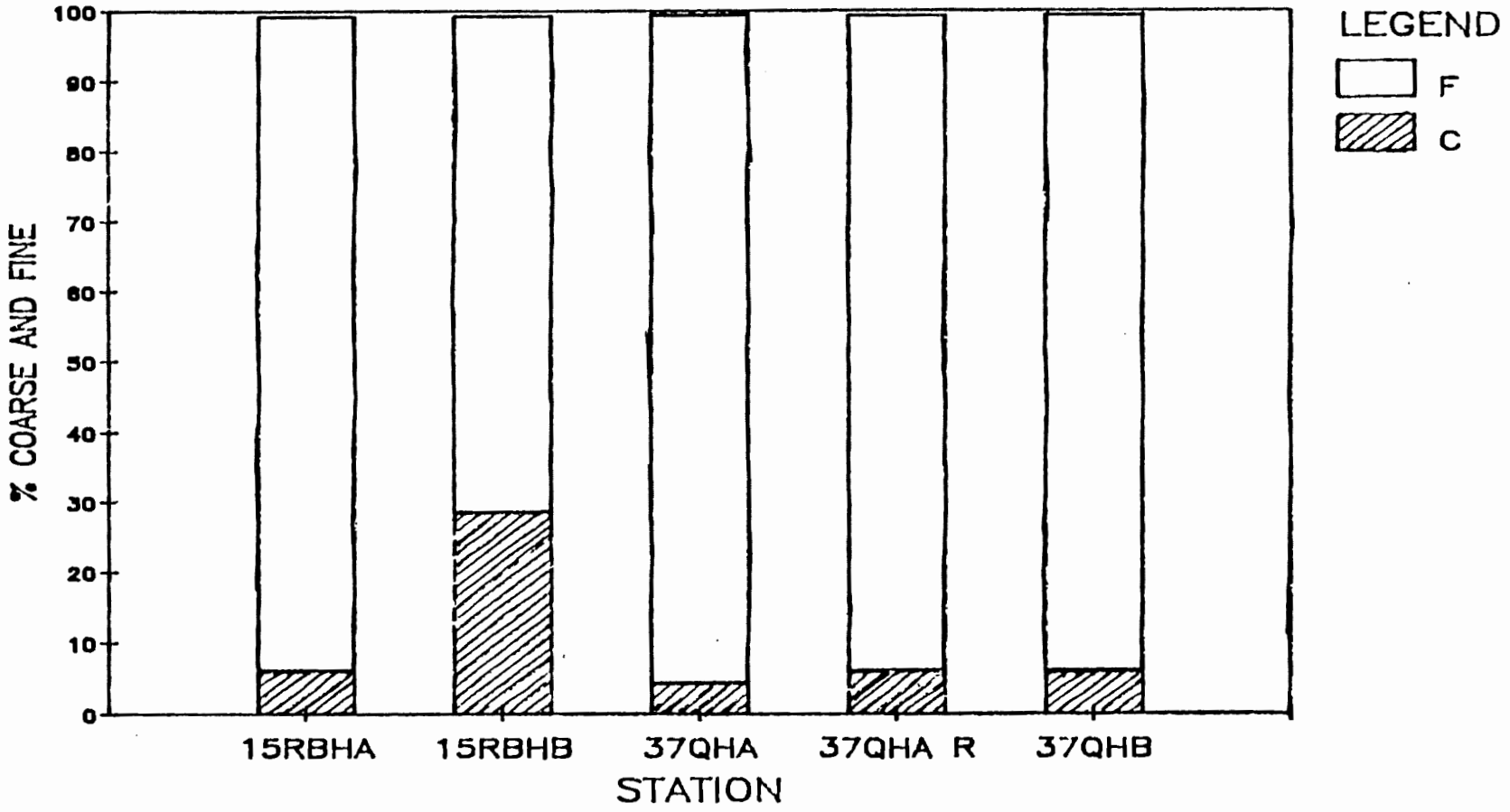
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 14
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA II
ONSET BAY / RED BROOK



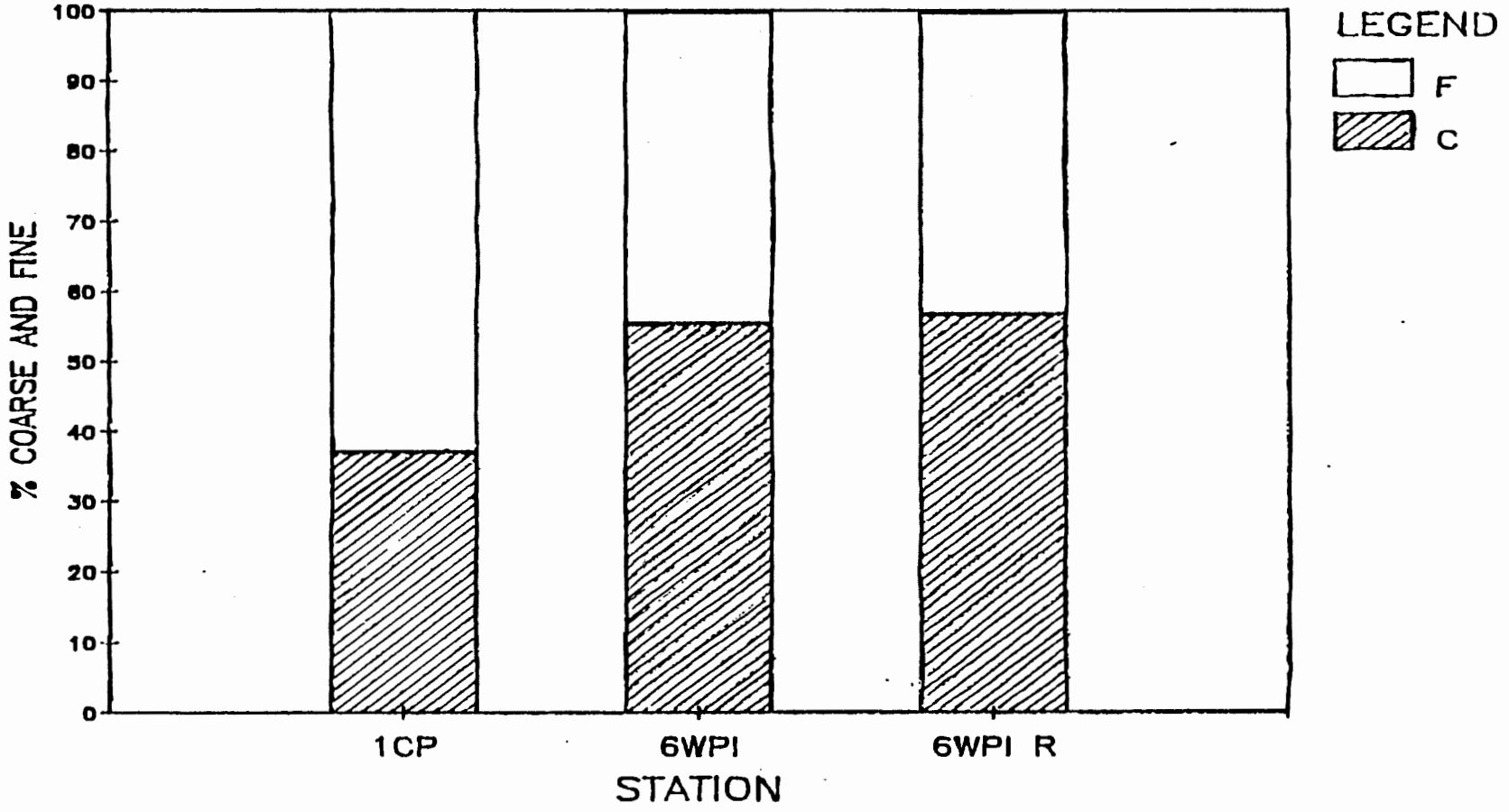
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 15
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA III
RED BROOK HARBOR / QUISSETT HARBOR



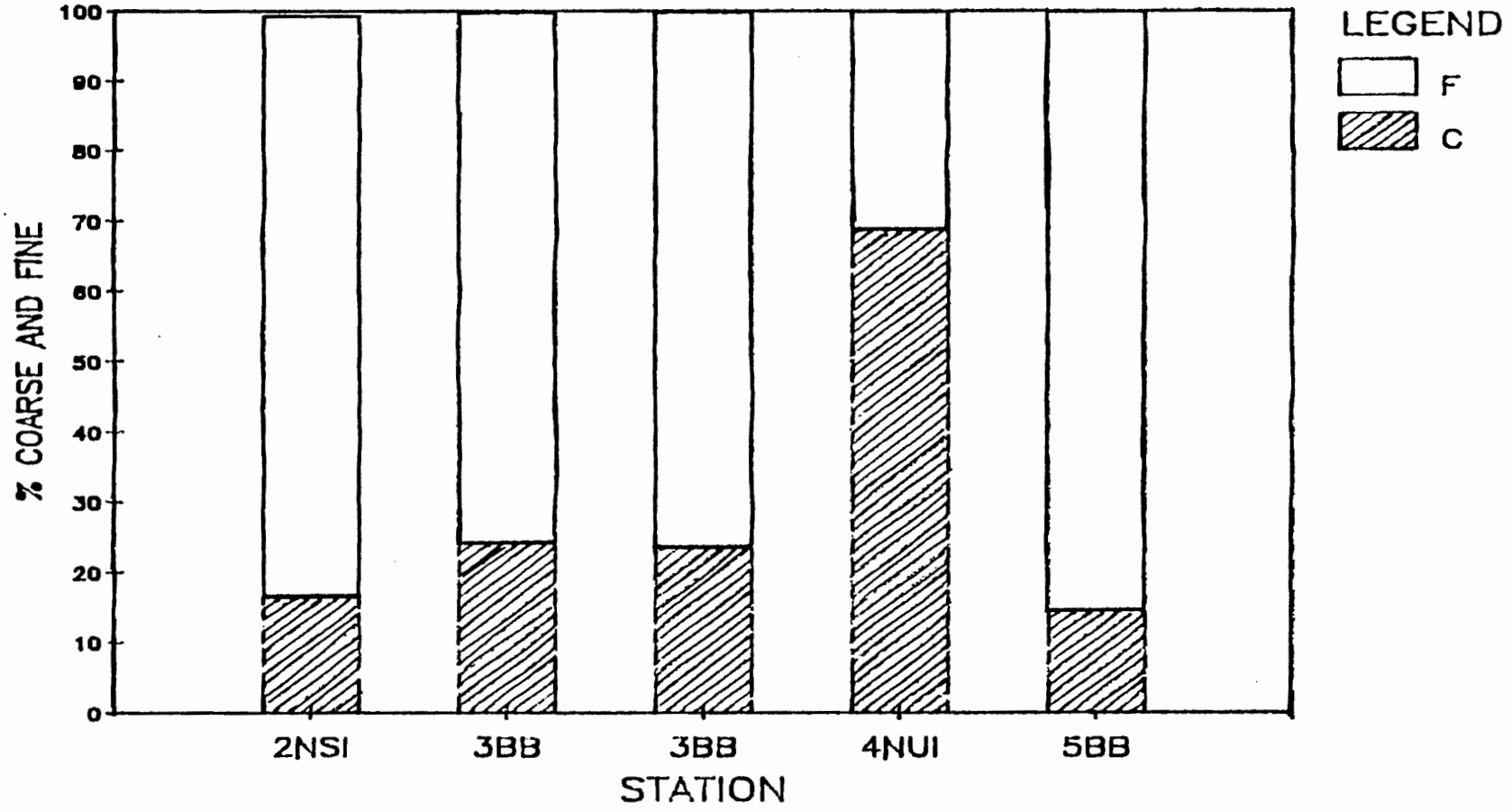
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 16
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA IV
ELIZABETH ISLANDS



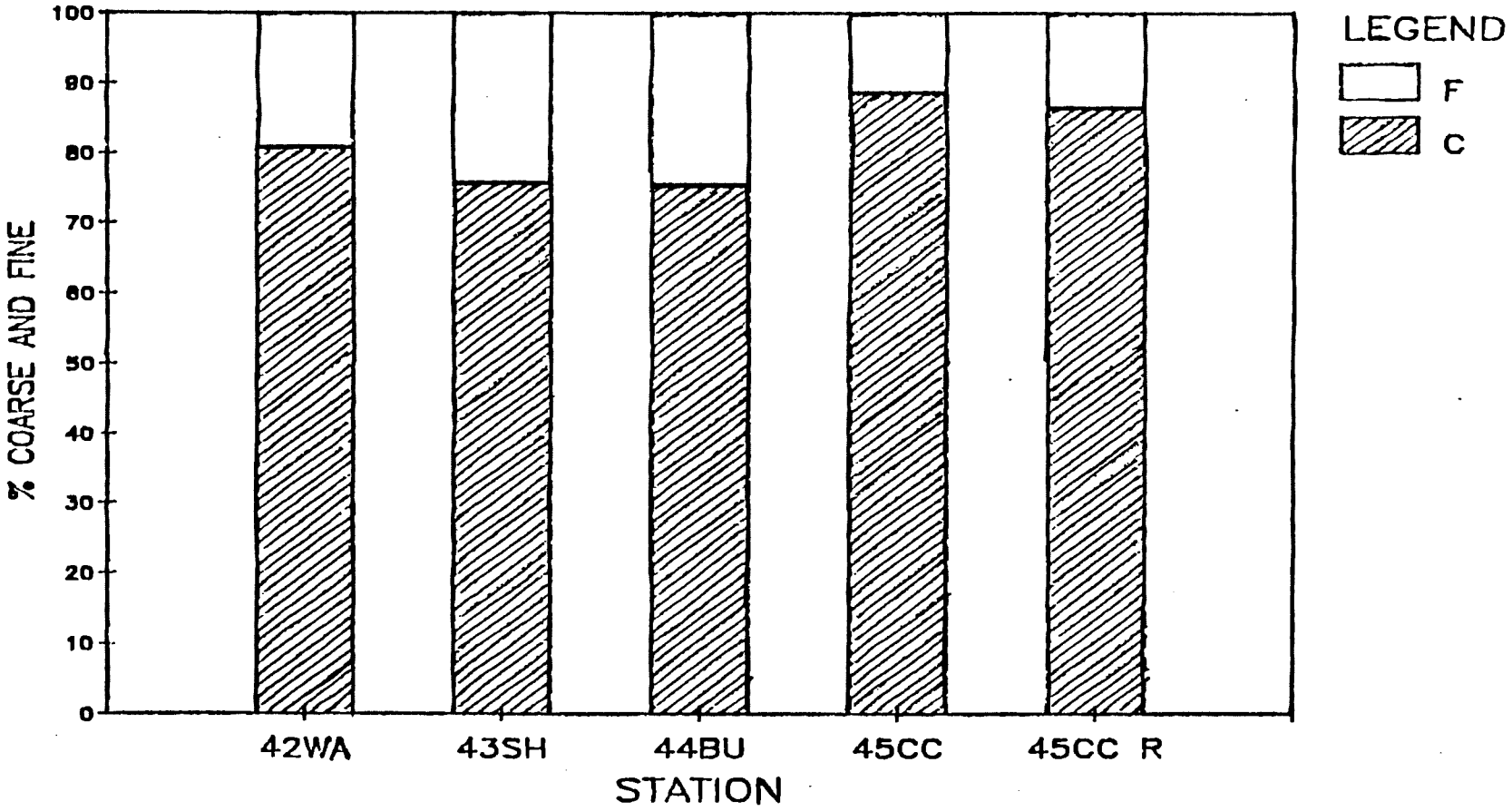
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 17A
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA V
OUTER BAY



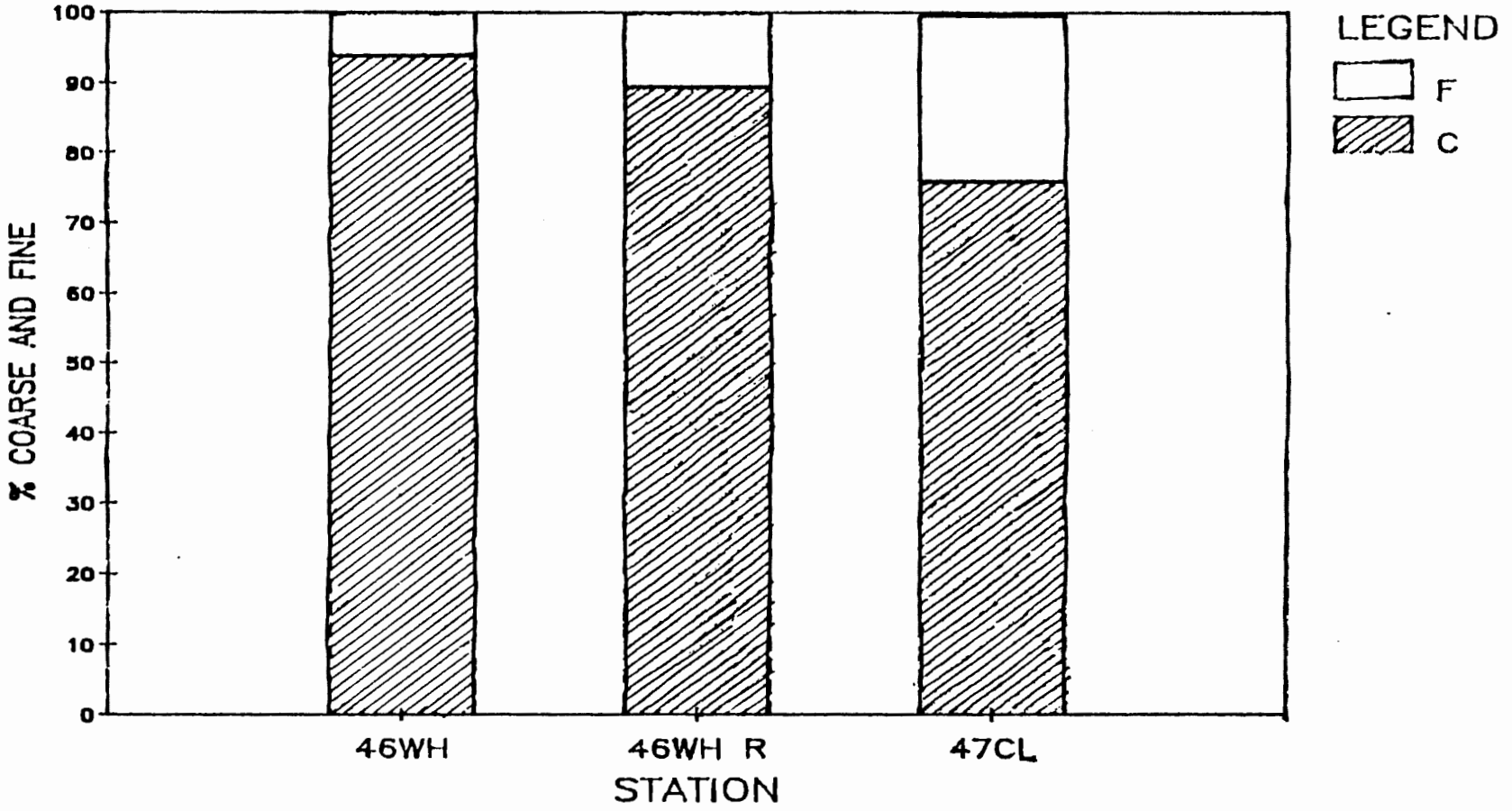
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 17B
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA V
OUTER BAY



R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 17C
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% COARSE AND FINE - AREA V
OUTER BAY



R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

TABLE 11

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

PARTICLE SIZE ANALYSIS PERCENT ERROR IN COARSE FRACTION

STATION	PERCENT ERROR
Area I	
10WPE13 (1)	1.91
10WPE13A (2)	6.35
13WPH16 (1)	0.74
13WPH16 R	0.40
13WPH16A (2)	1.00
11AB10 (1)	0.61
11AB10 (2)	4.80
15SR20 (1)	0.97
15SR20 (2)	0.23
Area II	
41MH0800 (1)	1.36
41MH0800 (2)	0.80
41MH0800 (2) R	0.30
24WA0180 (1)	1.72
24WA0180 (2)	0.60
110B0200 (1)	0.76
110B0200 (1) R	0.73
110B0200 (2)	2.10
1RB010A (1)	0.18
1RB010B (2)	0.43
Area III	
15RBH030A (1)	9.92
15RBH030B (2)	2.20
37QH030A (1)	7.90
37QH030A R	8.10
37QH030B (2)	6.63
Area IV	
1CP10	1.63
6WPI10 (1)	0.29
6WPI10 (2) R	0.28

TABLE 11 (CONTINUED)

STATION	PERCENT ERROR
Area V	
2NSI10	3.75
3BB10 (1)	1.01
3BB10 (2)	0.74
4NUI10	0.09
5BB20	1.01
42WA0400	0.08
43SH0500	0.17
44BU0300	0.33
45CC01	0.17
45CC01 R	0.13
46WH008	0.23
46WH008 R	0.13
47CL020	0.53

R = Replicate grain size analysis
(1)= First sample
(2)= Second sample

TABLE 12

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

PARTICLE SIZE ANALYSIS PERCENT FINER

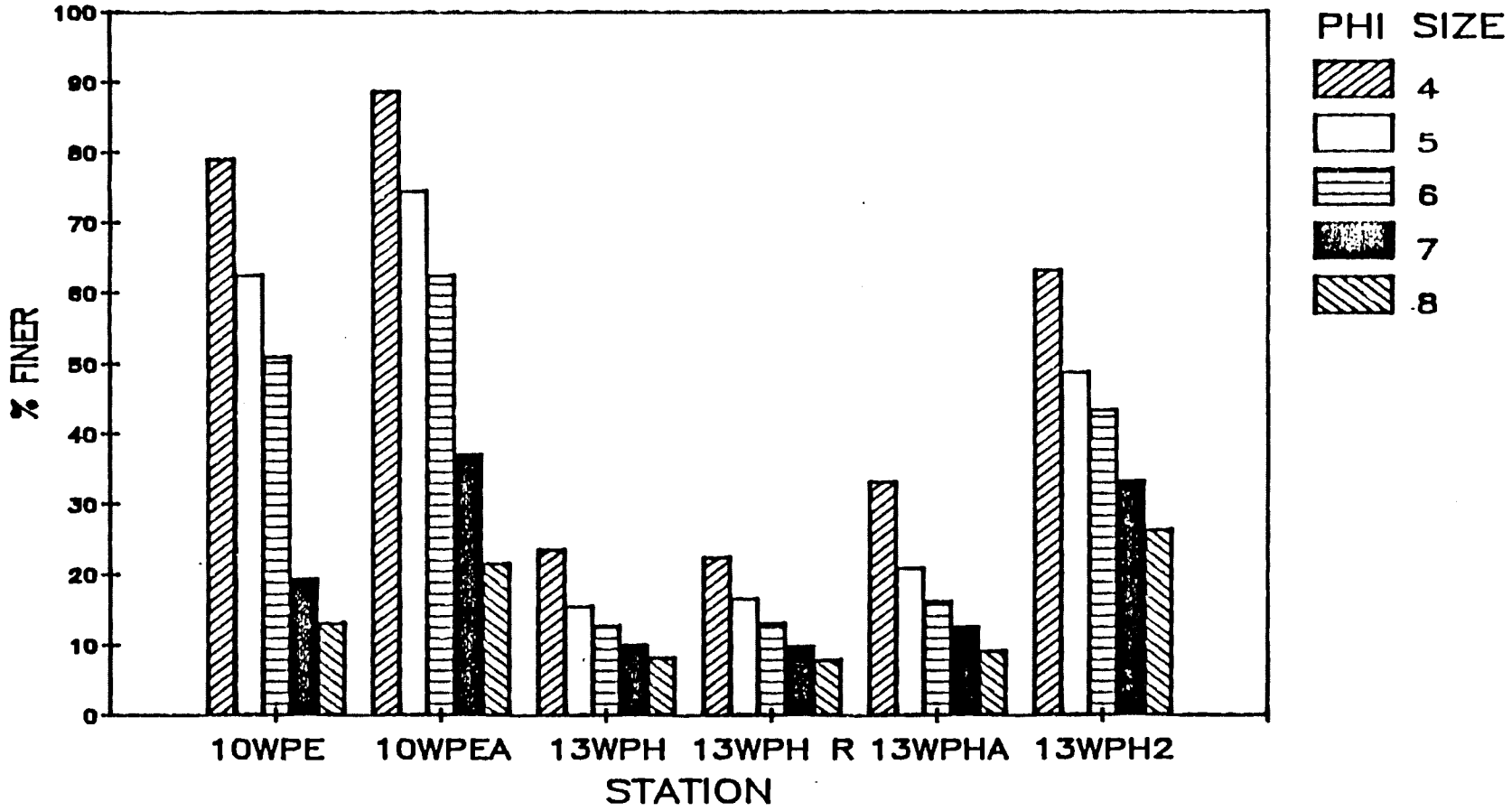
STATION	PHI SIZE 4	5	6	7	8
		Area I			
10WPE13 (1)	79.06	62.56	51.13	19.45	13.33
10WPE13A (2)	88.75	74.58	62.51	37.17	21.67
13WPH16 (1)	23.61	15.69	12.94	10.15	8.34
13WPH16 R	22.55	16.80	13.32	9.94	8.04
13WPH16A (2)	33.27	21.00	16.40	12.79	9.25
11AB10 (2)	66.82	54.84	48.00	4.48	3.14
11AB10 (1)	50.86	38.45	31.71	3.44	2.87
15SR20 (1)	90.06	67.40	55.19	37.54	20.73
15SR20 (2)	80.68	62.70	50.07	39.10	10.13
		Area II			
41MH0800 (1)	49.50	32.68	24.70	18.46	14.31
41MH0800 (2)	30.10	17.49	12.65	7.69	19.81
41MH0800 (2) R	28.07	17.54	13.39	10.61	8.40
24WA0180 (1)	61.13	47.96	41.02	33.81	18.63
24WA0180 (2)	40.10	23.67	21.67	17.44	6.76
110B0200 (1)	66.01	42.28	34.35	27.52	20.82
110B0200 (1) R	66.21	45.78	37.33	30.01	23.73
110B0200 (2)	85.44	90.90	54.78	22.99	13.10
1RB010A (1)	26.78	16.49	13.94	8.77	6.05
1RB010B (2)	14.07	12.04	10.49	8.95	7.44
		Area III			
15RBH030A (1)	93.22	27.51	25.32	42.54	38.97
15RBH030B (2)	70.81	50.11	43.49	13.87	11.21
37QH030A (1)	95.19	64.06	59.90	48.49	37.96
37QH030A R	93.34	84.90	76.21	59.70	46.28
37QH030B (2)	93.52	70.70	57.14	33.17	32.00
		Area IV			
1CP10	63.64	37.76	37.47	23.12	15.61
6WPI10 (1)	44.57	31.90	28.25	20.21	16.14
6WPI10 (2) R	43.27	33.52	28.18	25.42	4.73

TABLE 12 (CONTINUED)

STATION	PHI SIZE 4	5	6	7	8
		Area V			
2NSI10	82.74	41.70	56.57	42.50	34.56
3BB10 (1)	75.48	71.67	59.83	32.13	12.42
3BB10 (2)	76.18	59.20	47.28	36.92	9.56
4NUI10	31.24	24.38	20.39	15.94	12.49
5BB20	85.23	66.89	56.68	43.50	10.06
42WA0400	19.25	11.70	4.86	1.70	0.28
43SH0500	24.30	17.80	14.59	0.34	0.91
44BU0300	24.63	16.30	15.15	5.32	2.44
45CC01	11.35	5.99	6.50	3.73	2.32
45CC01 R	13.50	10.38	8.95	5.44	1.96
46WH008	5.85	3.03	2.48	2.12	1.78
46WH008 R	10.62	5.69	5.77	2.71	1.82
47CL020	23.99	18.14	15.12	1.65	1.12

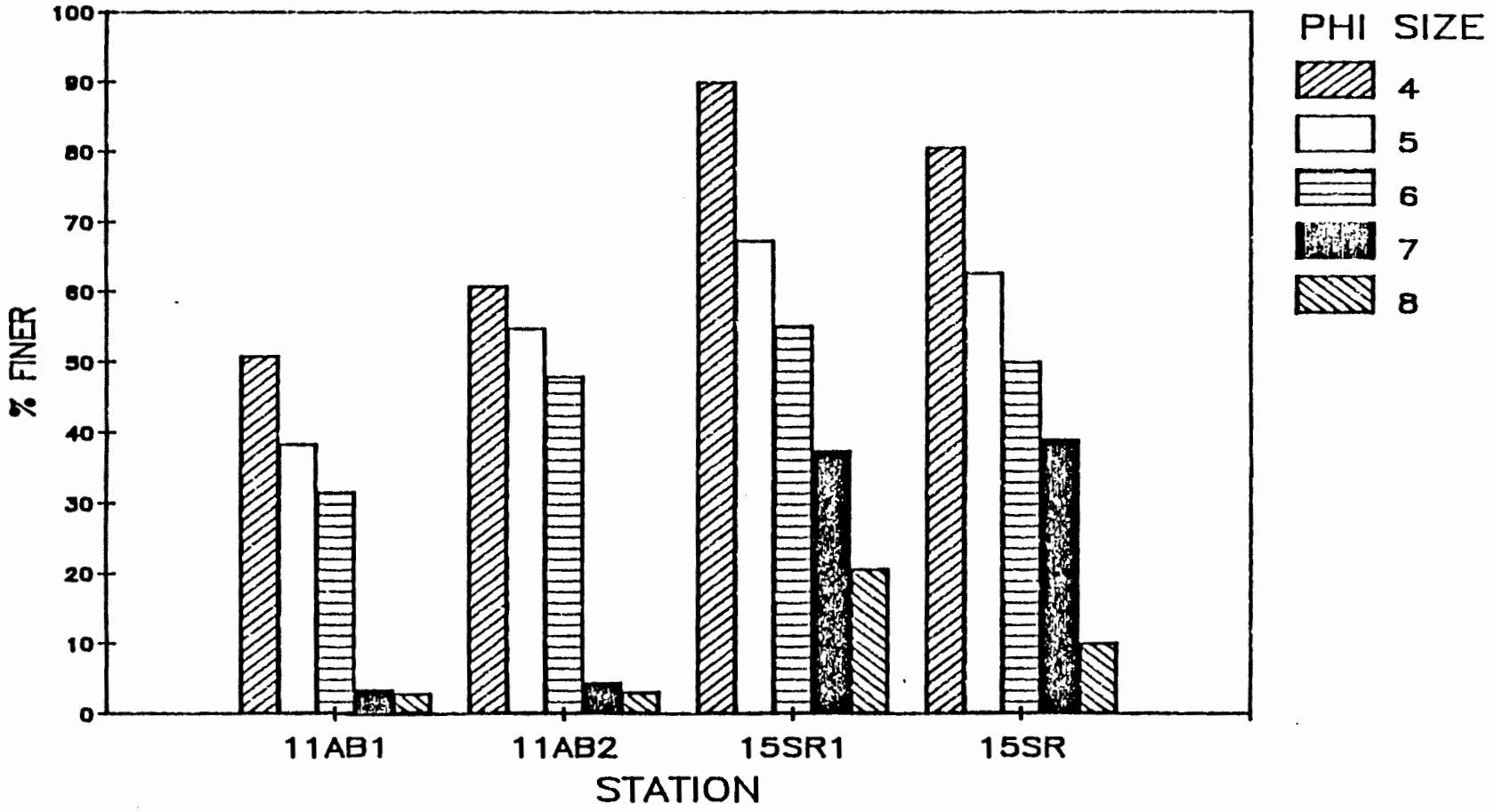
R = Replicate grain size analysis
(1)= First sample
(2)= Second sample

FIGURE 18
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA I
WESTPORT RIVER



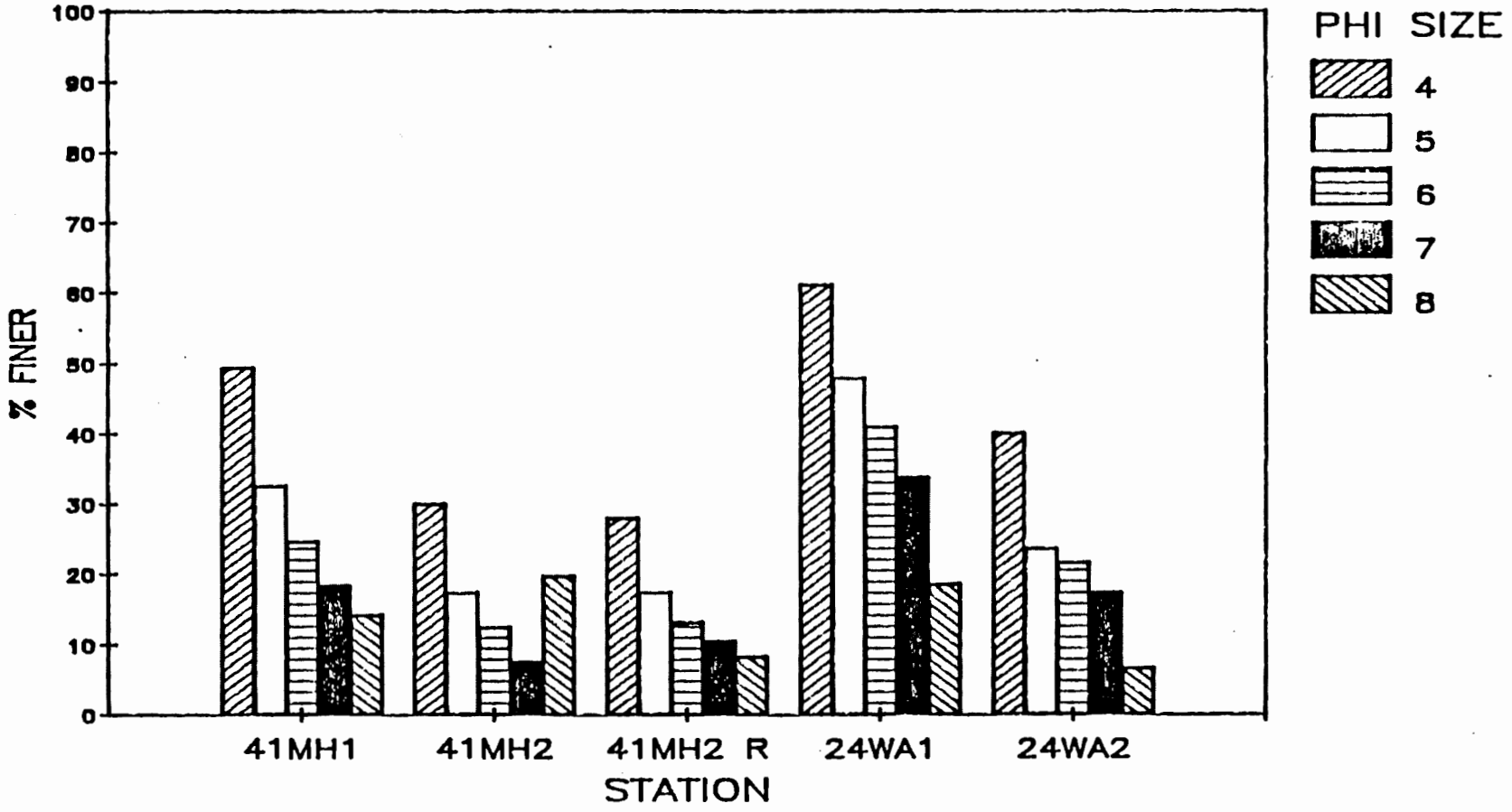
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 19
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA I
APPONAGANSETT BAY / SLOCUM RIVER



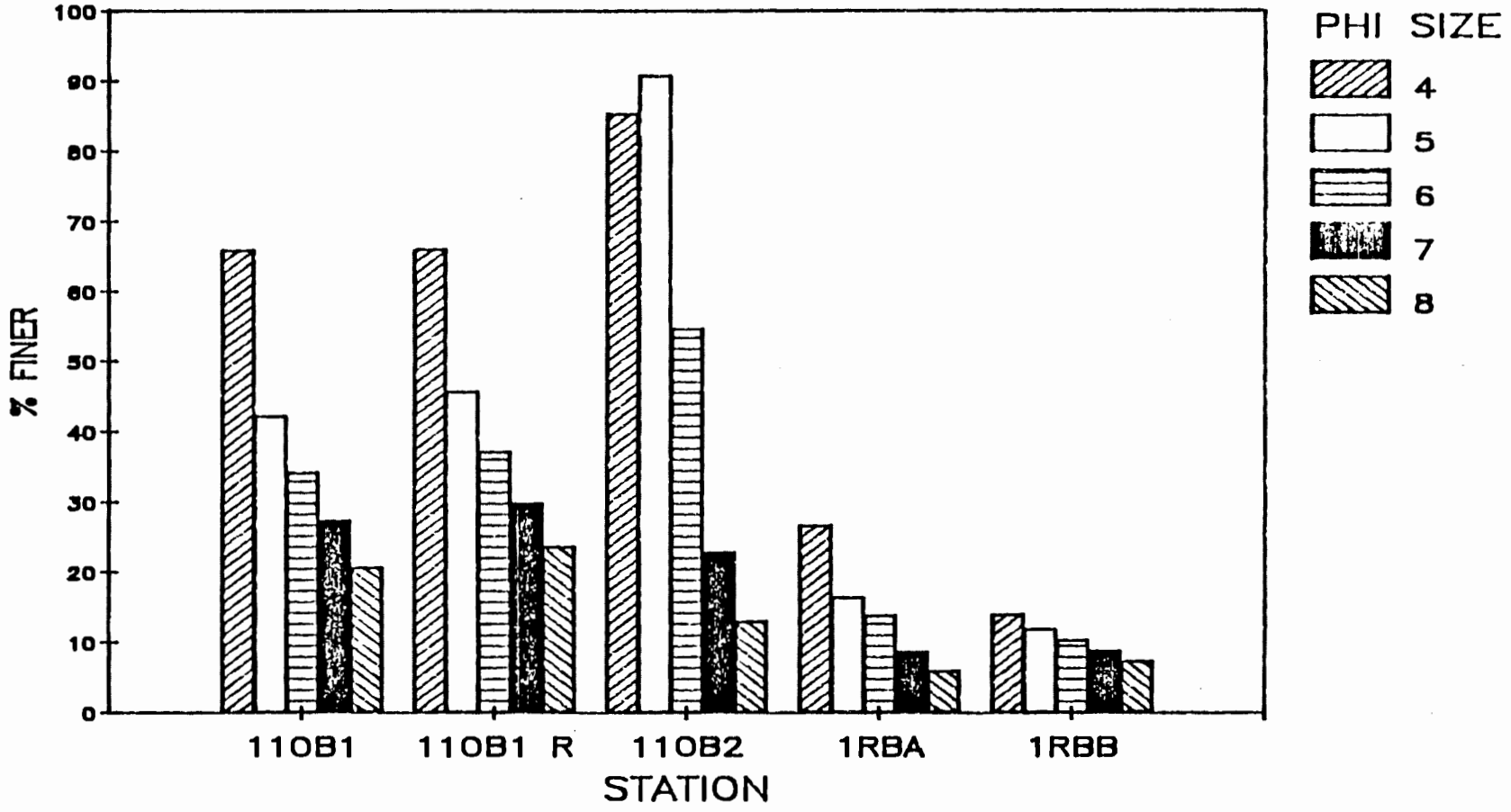
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 20
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA II
MATTAPOISETT HARBOR / WAREHAM RIVER



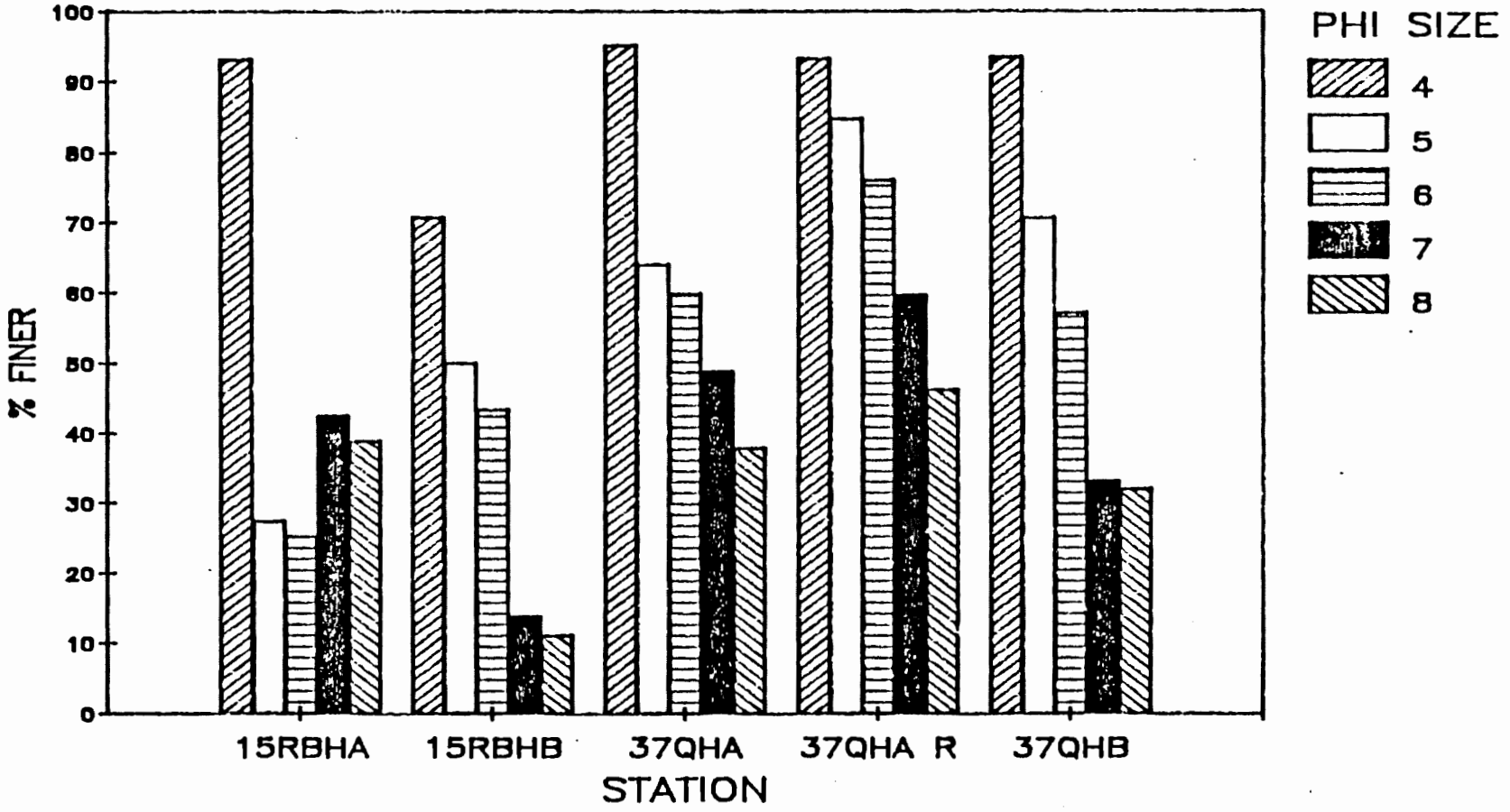
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 21
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA II
ONSET BAY / RED BROOK



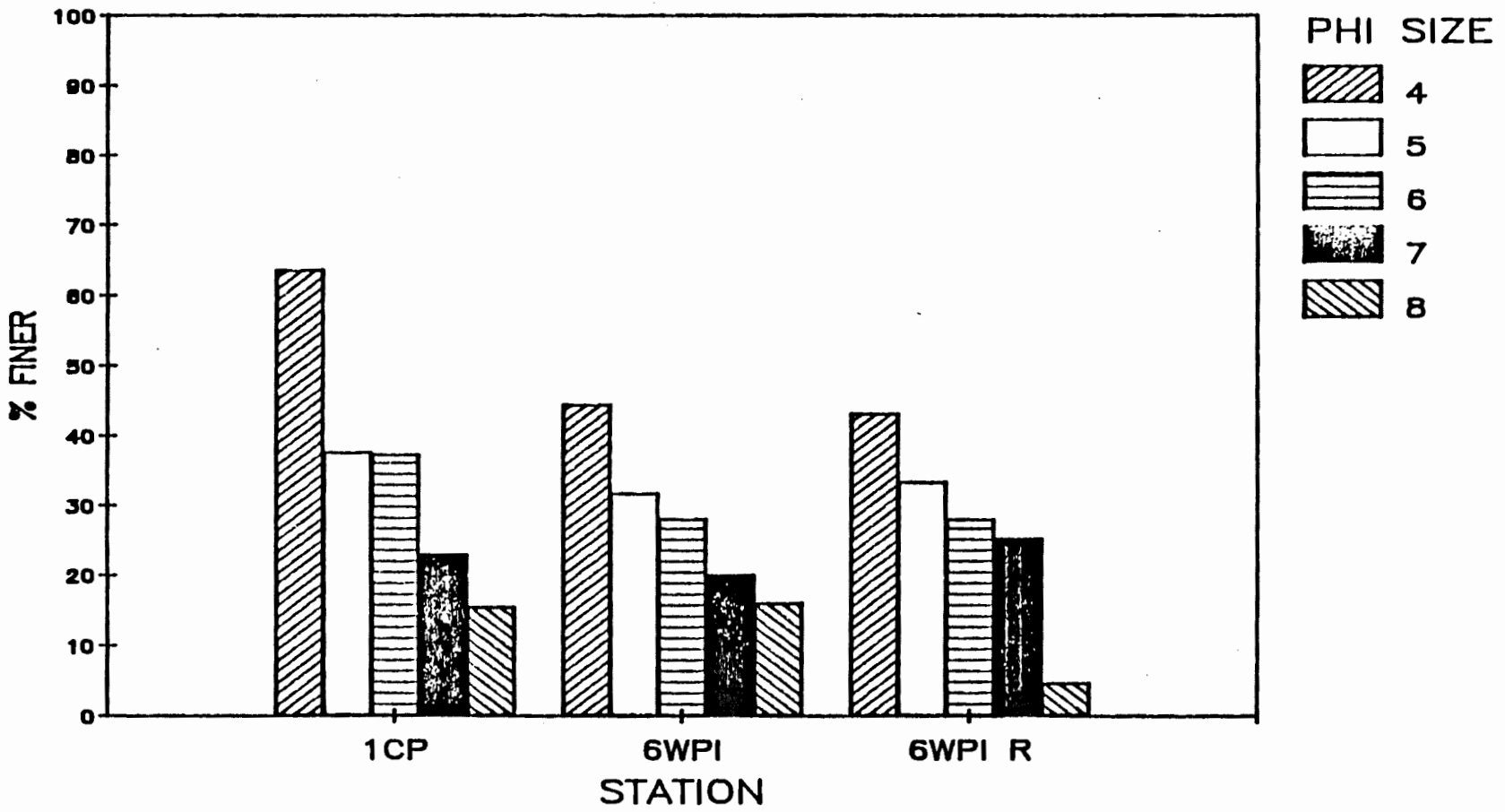
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 22
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA III
RED BROOK HARBOR / QUISSETT HARBOR



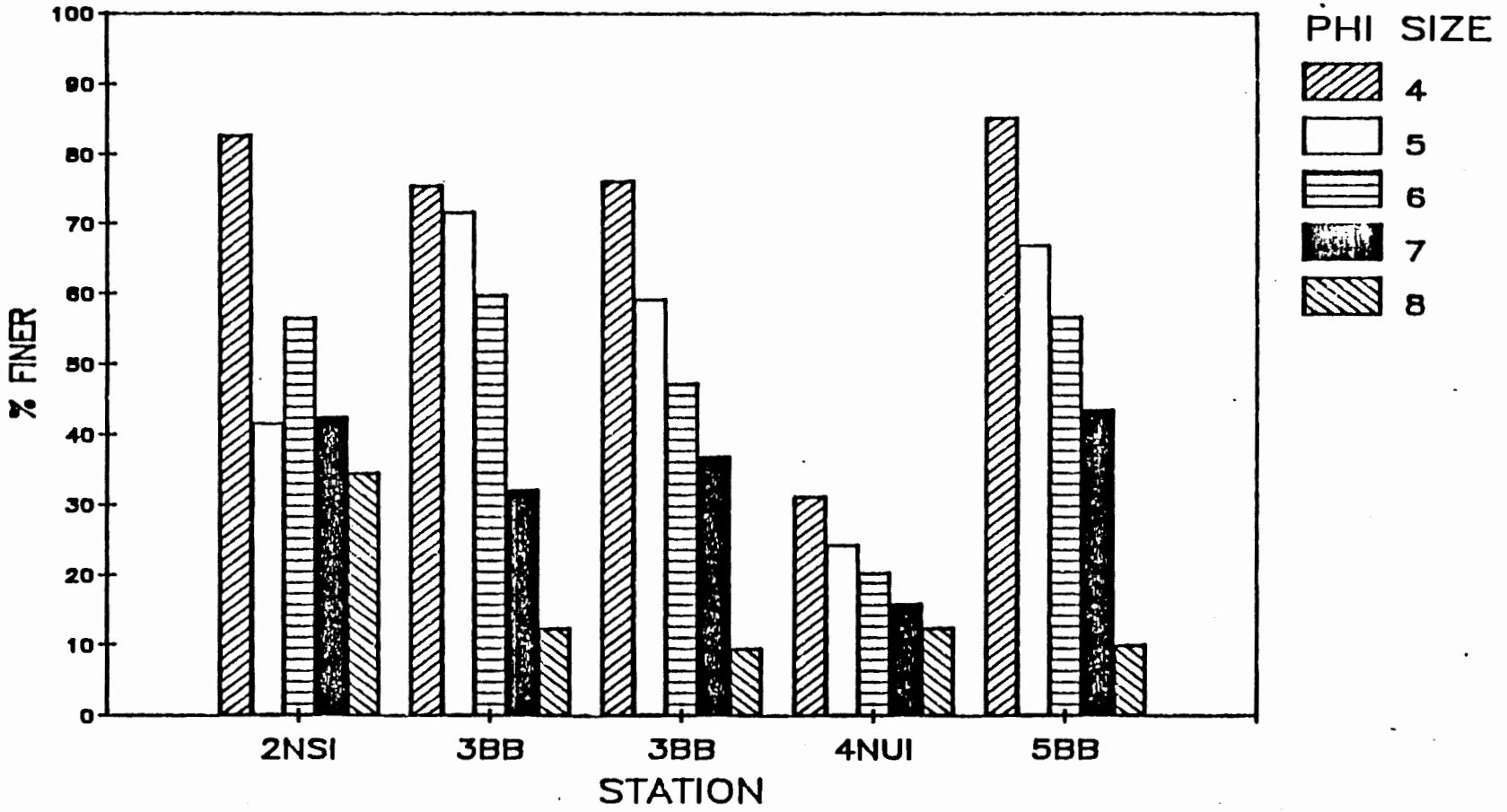
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 23
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA IV
ELIZABETH ISLANDS



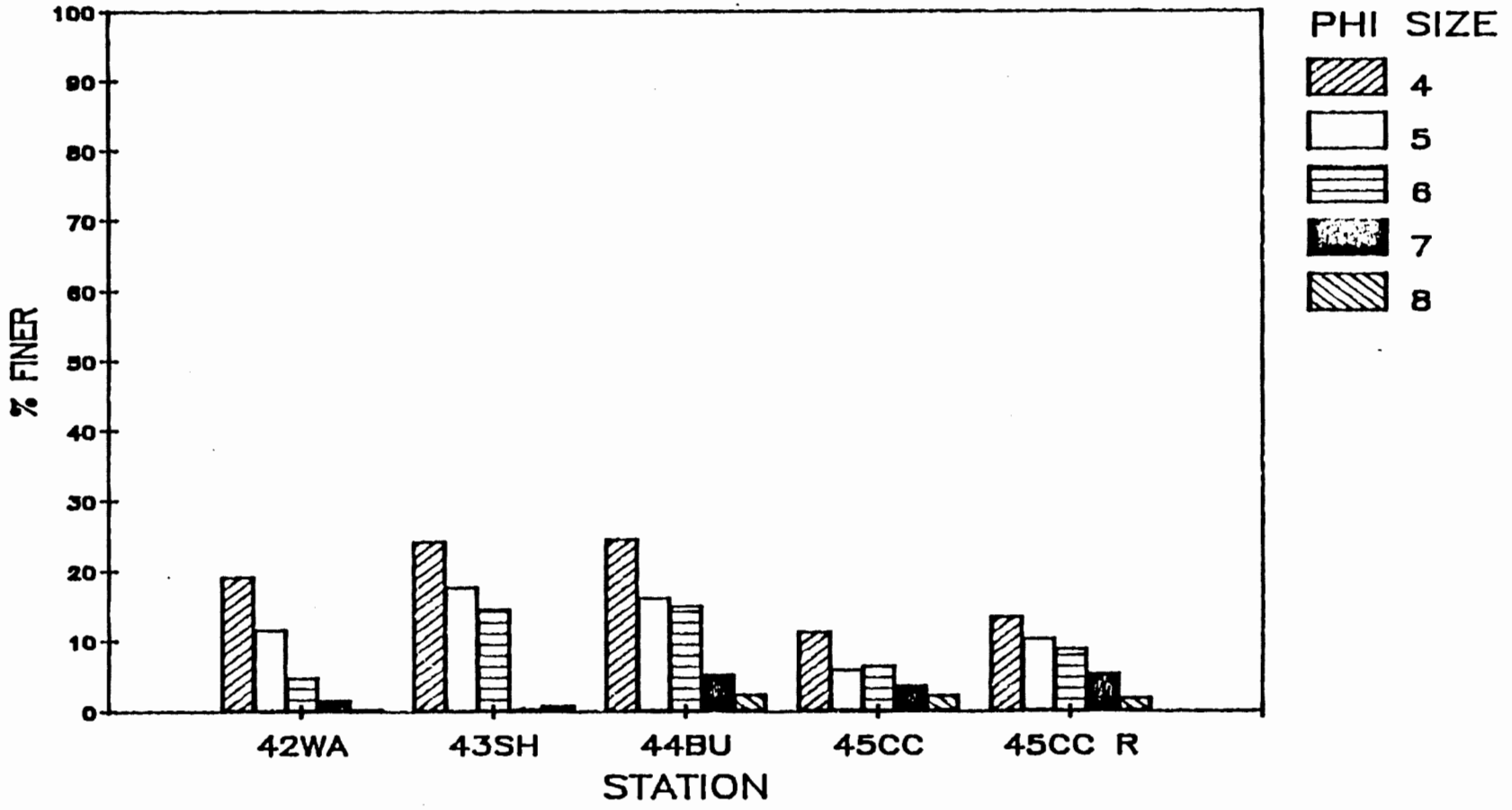
R DENOTES REPLICATE

FIGURE 24A
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA V
OUTER BAY



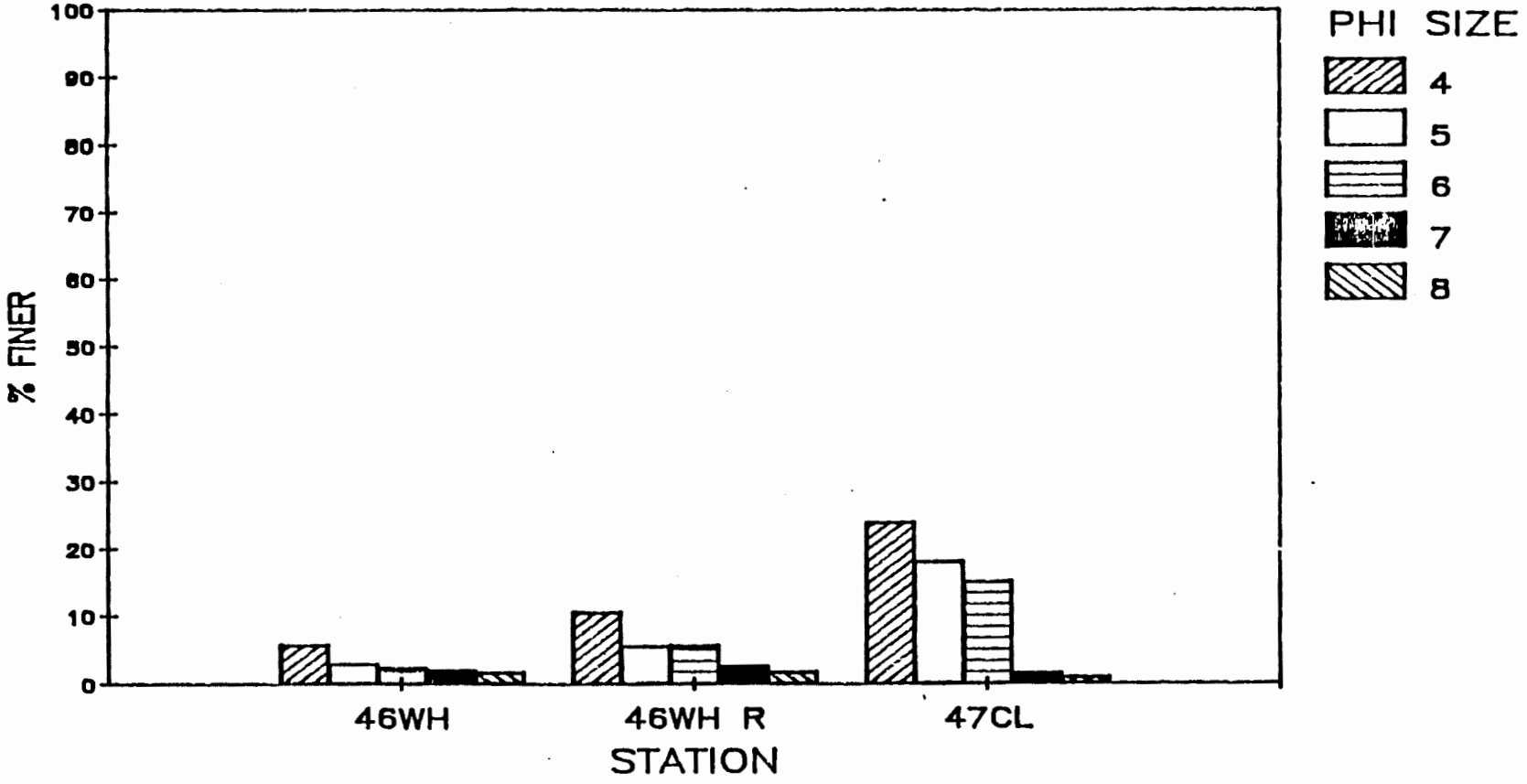
R DENOTES REPLICATE

FIGURE 24B
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA V
OUTER BAY



R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 24C
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% FINER - AREA V
OUTER BAY



R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

TABLE 13

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

PERCENT LARGER

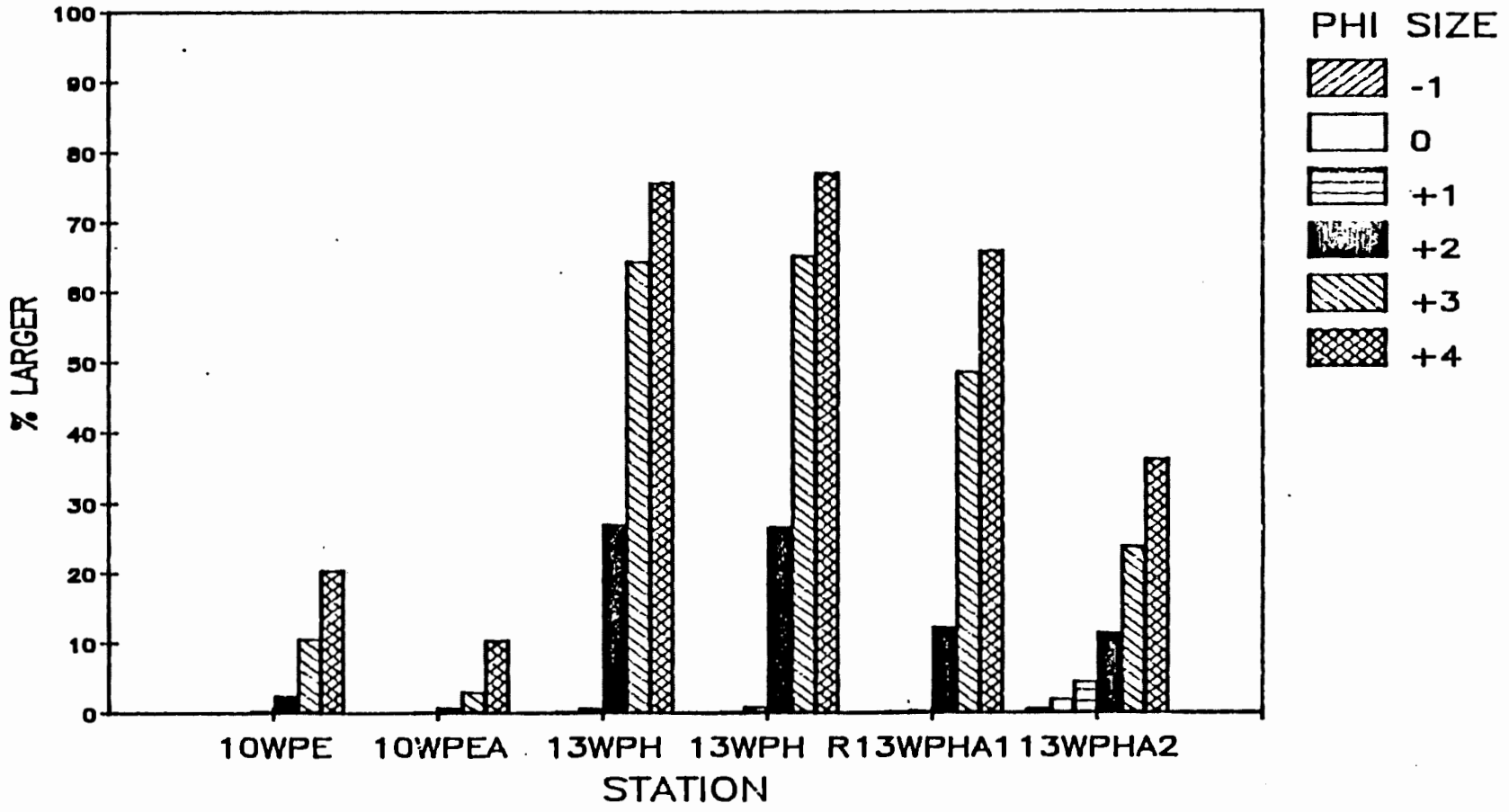
STATION	PHI SIZE -1	0	+1	+2	+3	+4
			Area I			
10WPE13 (1)	0	0	0.37	2.59	10.70	20.54
10WPE13A (2)	0	0	0.08	0.84	3.10	10.54
13WPH16 (1)	0	0.10	0.83	27.17	64.41	75.83
13WPH16 R	0	0.17	1.02	26.76	65.16	77.15
13WPH16A (2)	0	0.08	0.42	12.37	48.65	66.06
11AB10 (1)	2.14	3.29	5.63	12.86	34.12	48.84
11AB10 (2)	0	0.29	1.62	6.42	21.50	31.58
15SR20 (1)	5.95	5.97	6.04	6.22	6.44	9.84
15SR20 (2)	0	0	0.12	0.71	2.57	19.27
			Area II			
41MH0800 (1)	0	0.02	0.20	1.36	15.57	49.82
41MH0800 (2)	0	0.14	0.88	4.39	28.25	69.34
41MH0800 (2) R	0.83	0.83	1.66	4.56	20.16	71.71
24WA0180 (1)	0	0	0.33	3.50	16.92	38.22
24WA0180 (2)	0.11	0.87	8.07	22.95	40.35	59.54
110B0200 (1)	0	0	1.40	6.96	11.17	33.73
110B0200 (1) R	0	0	0.83	5.39	9.62	33.54
110B0200 (2)	0	0	0.19	1.82	3.66	14.25
1RB010A (1)	0.58	4.19	29.60	63.15	70.58	73.08
1RB010B (2)	0.26	2.76	29.04	75.67	83.68	85.56
			Area III			
15RBH030A (1)	0	0	1.50	5.03	5.72	6.10
15RBH030B (2)	0.34	1.08	7.71	20.46	23.92	28.57
37QH030A (1)	0	0.06	0.26	2.74	3.08	4.43
37QH030A R	0	0	0.09	3.64	4.22	6.12
37QH030B (2)	0	0	0.28	3.20	3.96	6.05
			Area IV			
1CP10	0.13	3.96	16.55	30.30	34.46	36.96
6WPI10 (1)	0	0.16	2.35	10.67	39.07	55.27
6WPI10 (2) R	4.85	5.11	7.10	14.38	40.97	56.57

TABLE 13 (CONTINUED)

STATION	PHI SIZE -1	0	+1	+2	+3	+4
			Area V			
2NSI10	0	0	0.08	0.45	0.95	16.61
3BB10 (1)	0.11	1.91	2.09	4.93	7.52	24.27
3BB10 (2)	0	0.03	0.08	0.41	2.28	23.64
4NUI10	0	0.08	1.26	6.77	36.47	68.70
5BB20	0.14	0.18	0.64	2.11	3.32	14.62
42WA0400	0.90	2.75	12.63	36.39	63.92	80.69
43SH0500	1.11	2.02	2.96	8.47	43.41	75.57
44BU0300	0	0	0.06	0.41	23.03	75.13
45CC01	0	0.20	1.31	15.20	82.31	88.50
45CC01 R	1.35	4.58	11.76	22.68	73.43	86.39
46WH008	1.82	6.87	48.75	82.11	90.22	93.93
46WH008 R	13.97	25.84	44.95	73.47	85.97	89.27
47CL020	0.66	1.75	9.85	32.13	57.83	75.60

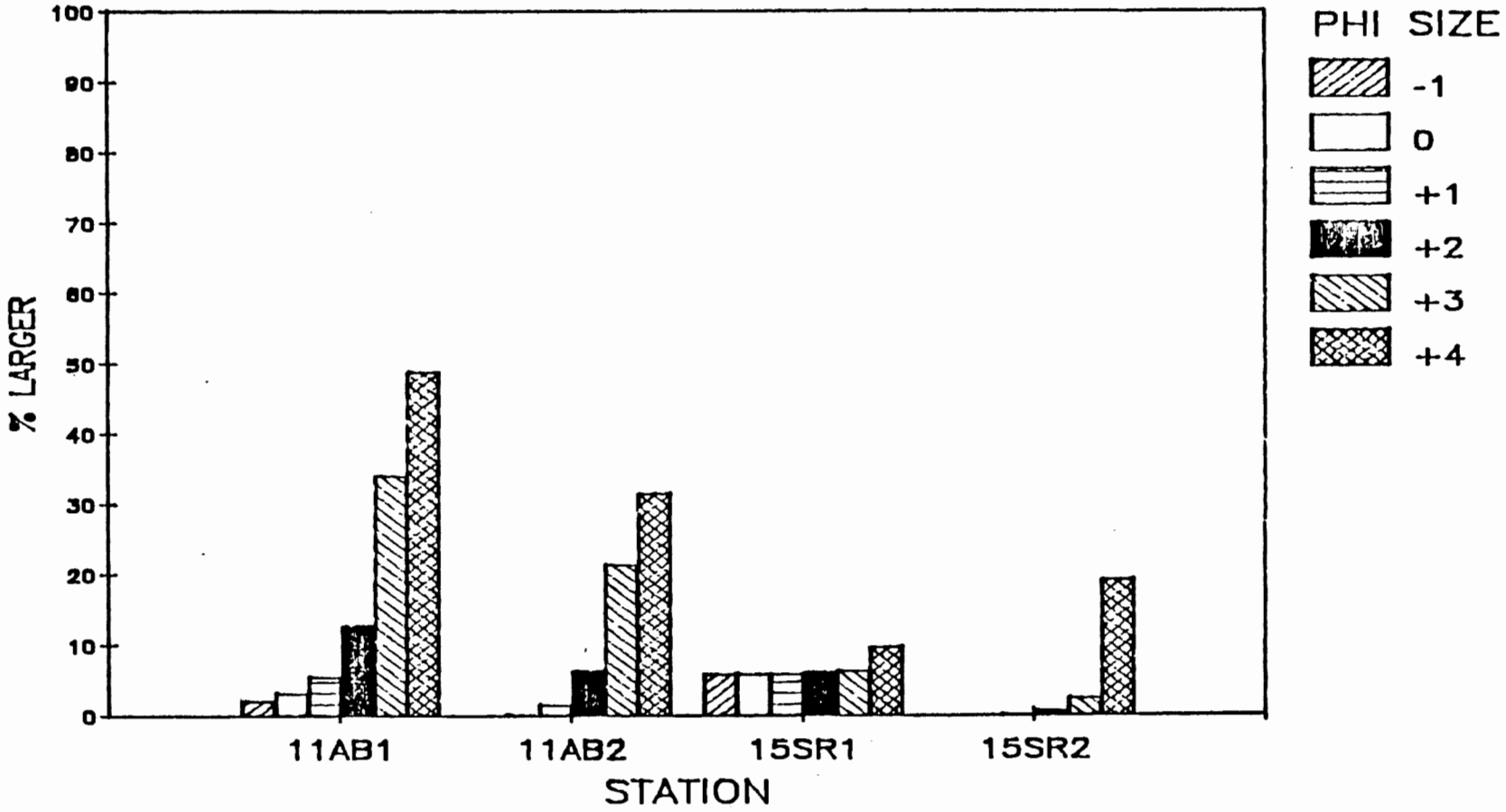
R = Replicate grain size analysis
(1)= First sample
(2)= Second sample

FIGURE 25
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA I
WESTPORT RIVER



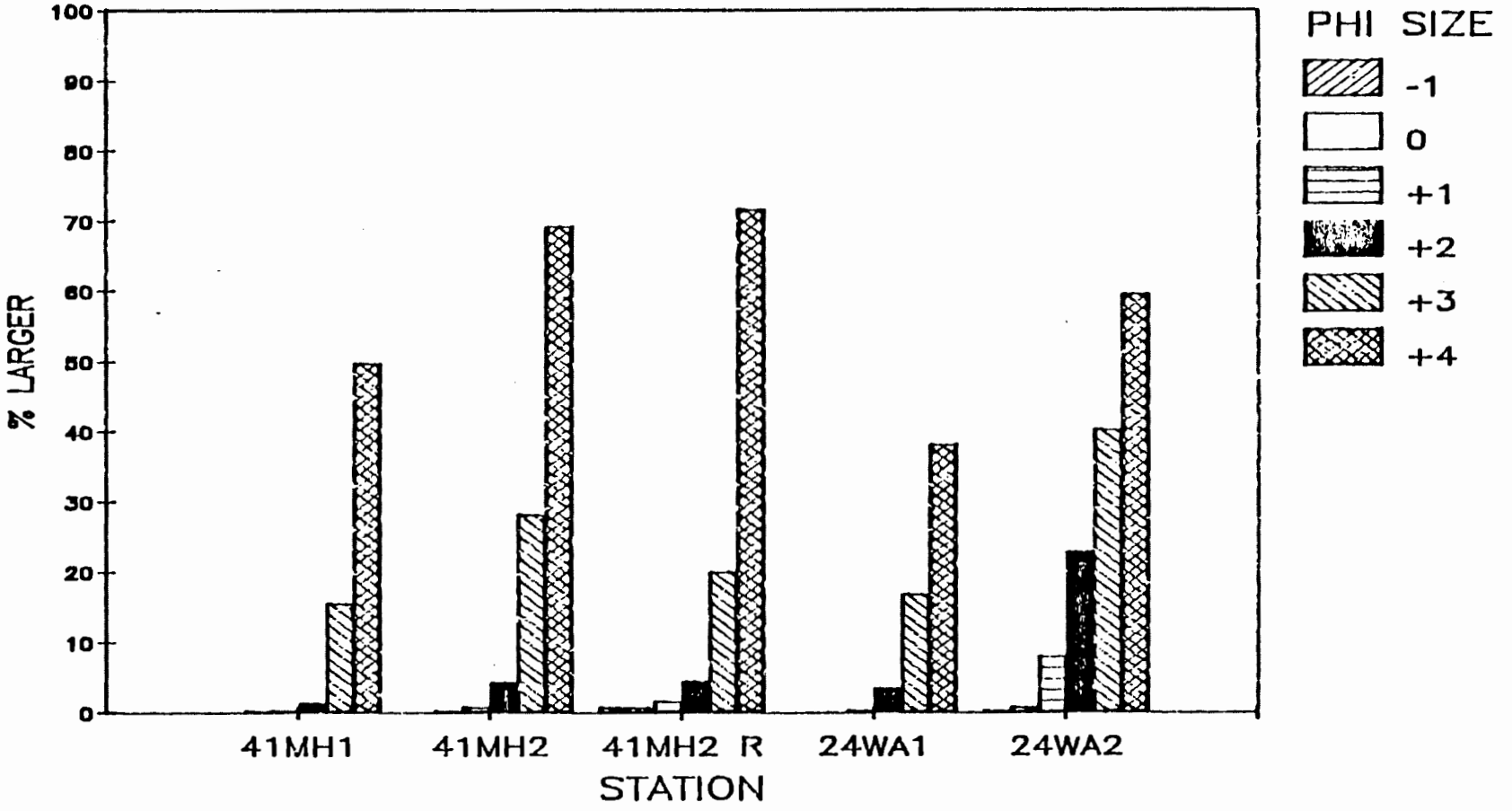
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 26
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA I
APPONAGANSETT BAY / SLOCUM RIVER



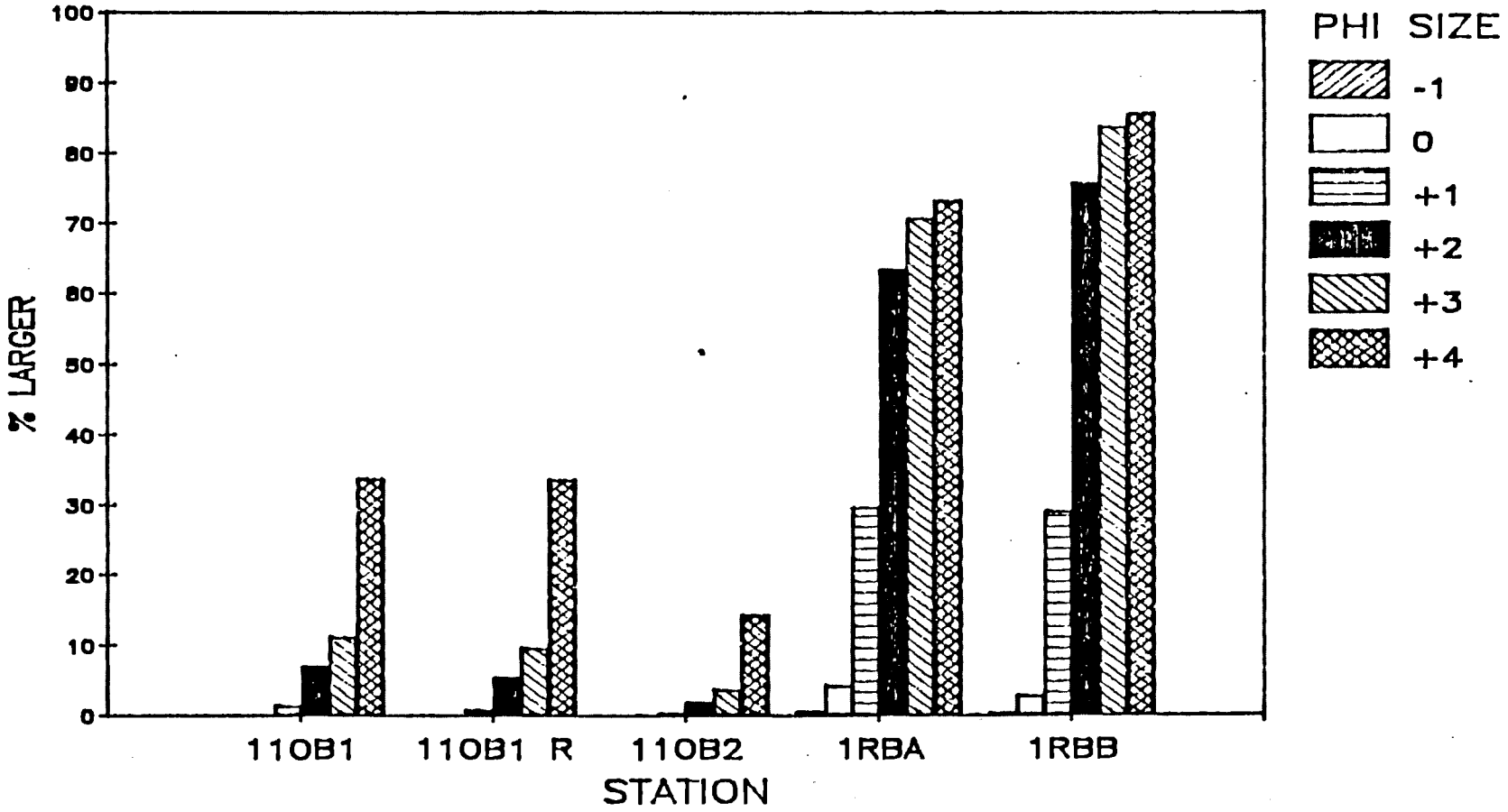
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 27
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA II
MATTAPOISETT HARBOR / WAREHAM RIVER



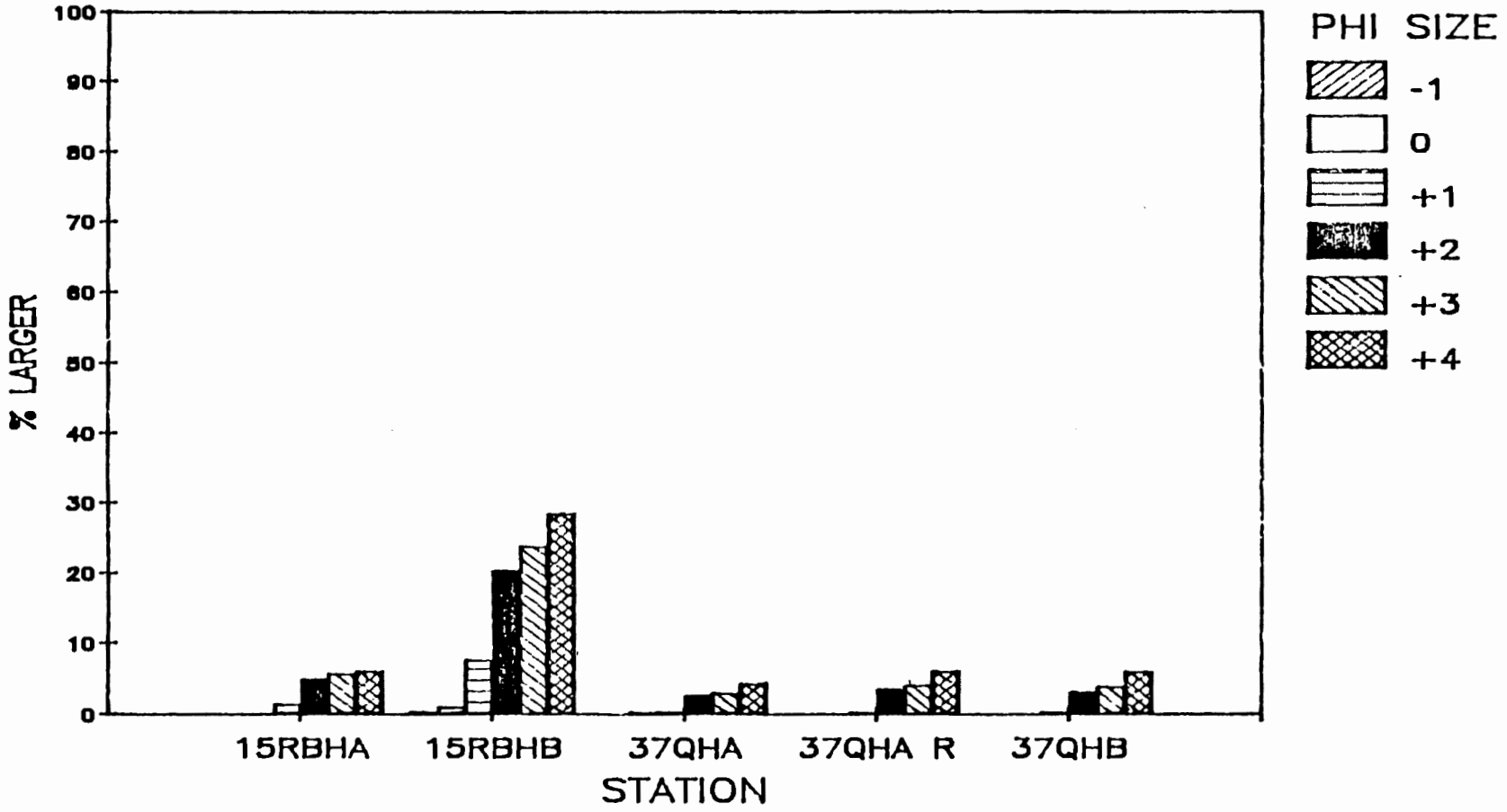
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 28
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA II
ONSET BAY / RED BROOK



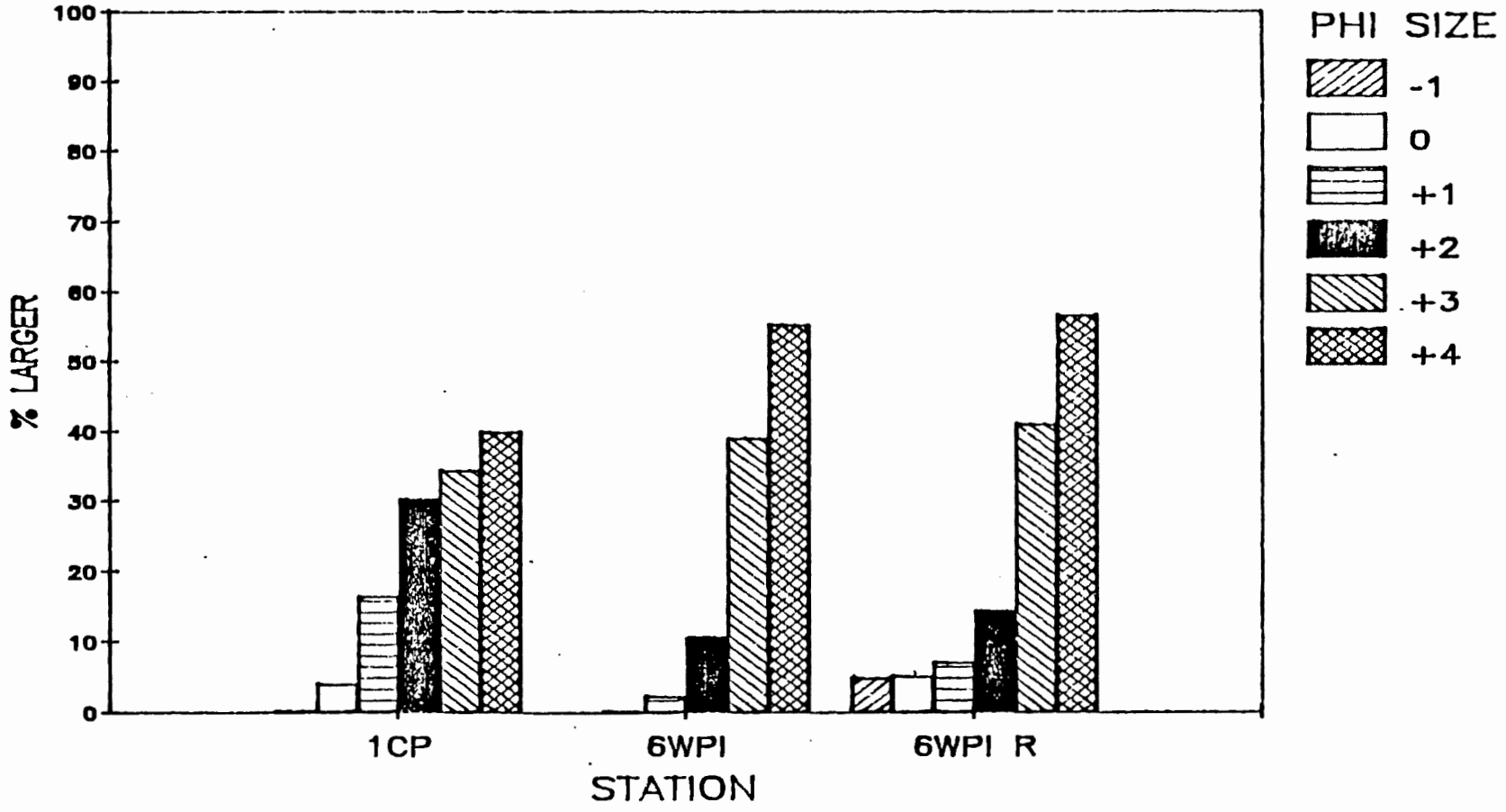
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 29
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA III
RED BROOK HARBOR / QUISSETT HARBOR



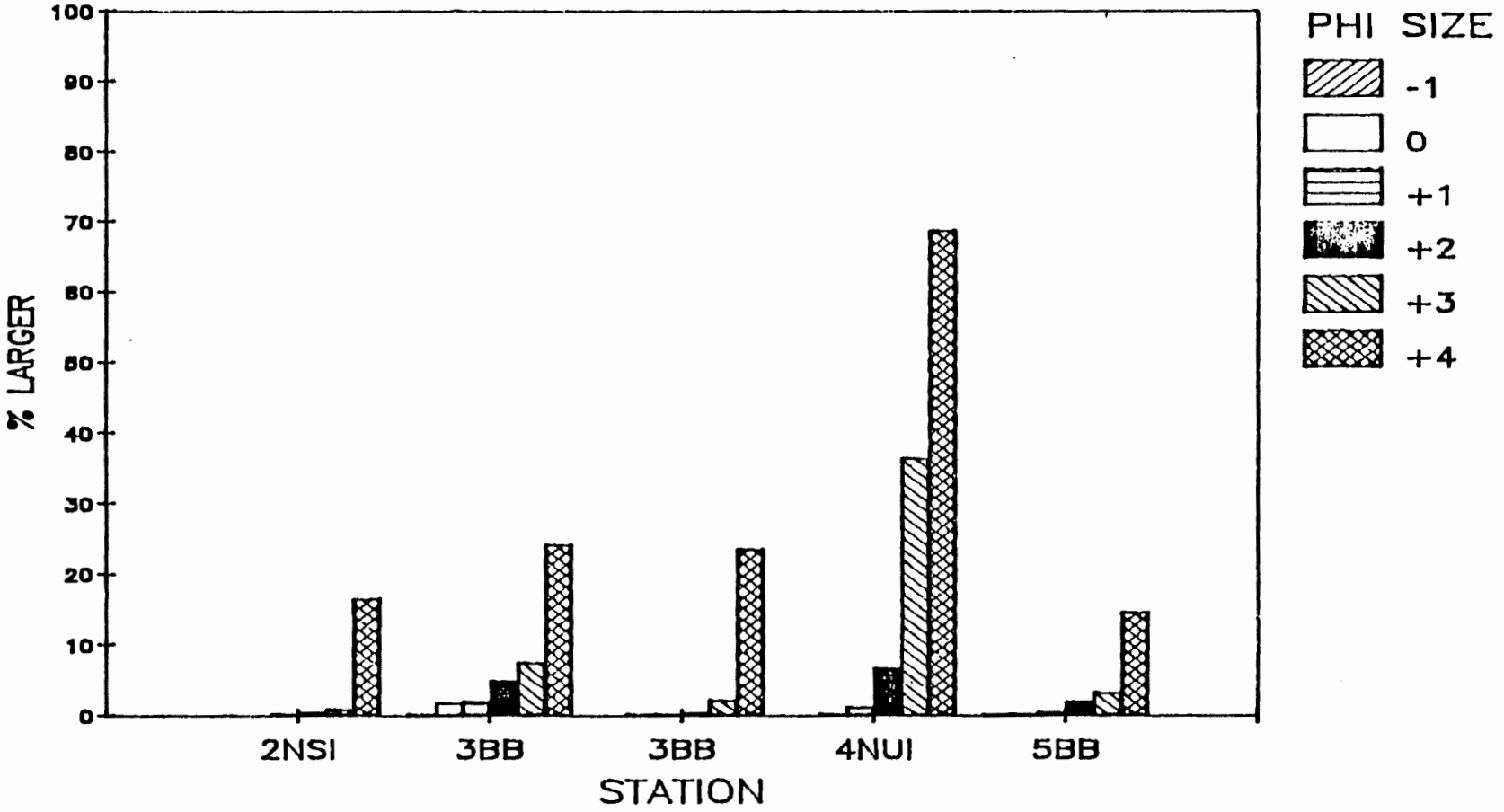
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 30
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA IV
ELIZABETH ISLANDS



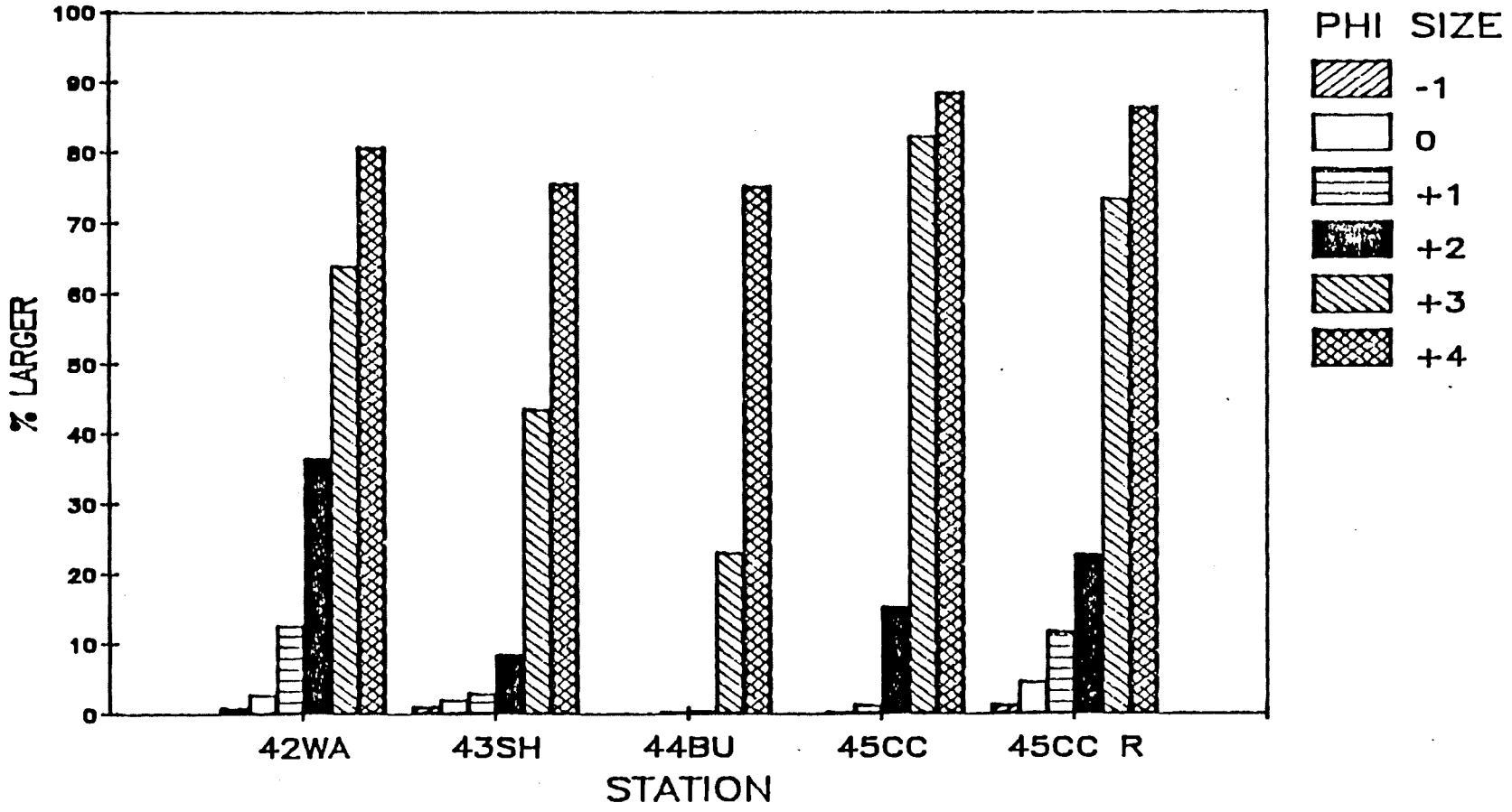
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 31A
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA V
OUTER BAY



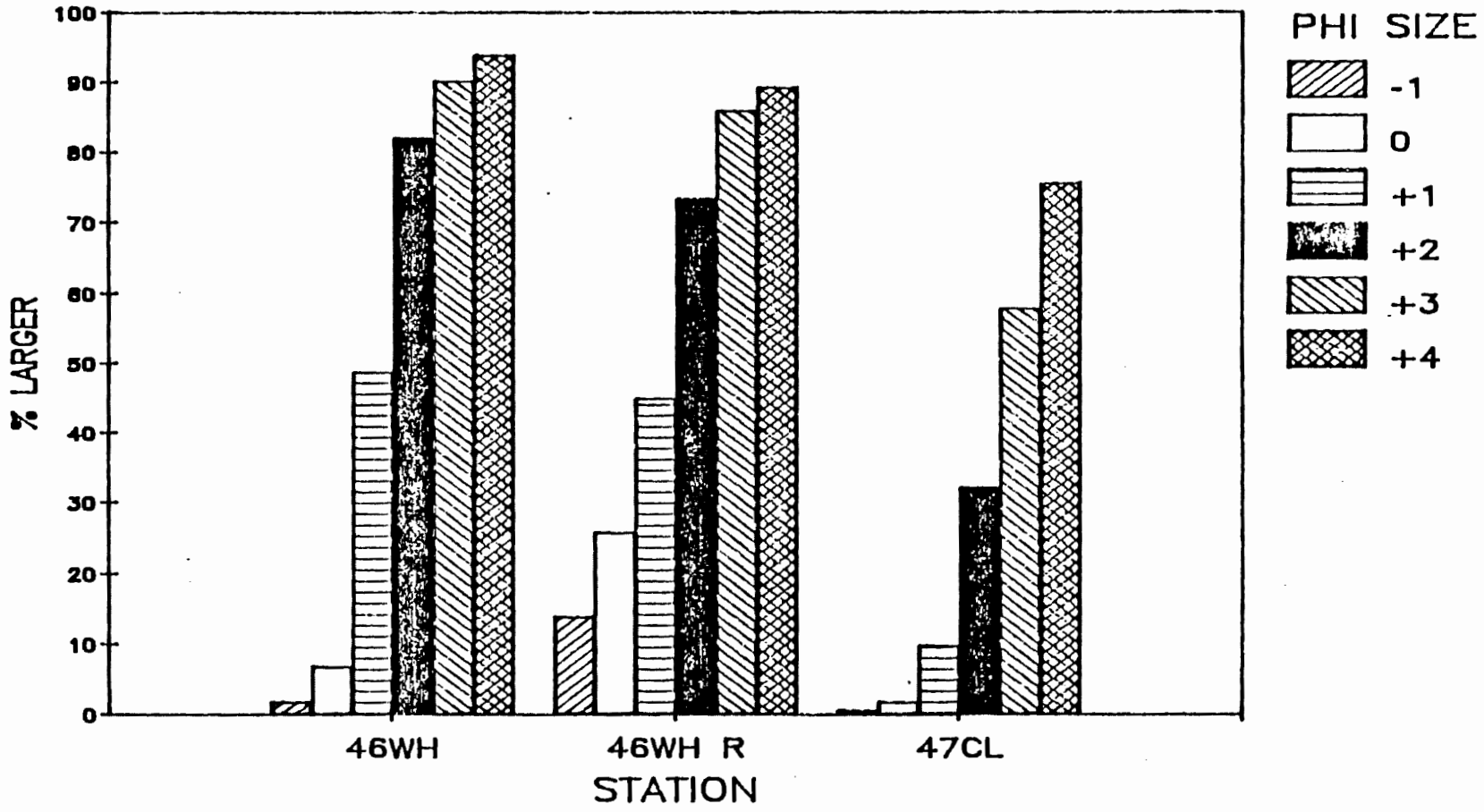
R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 31B
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA V
OUTER BAY



R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

FIGURE 31C
BUZZARDS BAY PARTICLE SIZE ANALYSIS
% LARGER - AREA V
OUTER BAY



R DENOTES REPLICATE OF GRAIN SIZE ANALYSIS.

TABLE 14

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

PARAMETER AND COLLECTION METHODS EMPLOYED AT SEDIMENT STATIONS

PARAMETER	SAMPLE VOLUME (liters)	SAMPLE CONTAINER	IMMEDIATE SHIPBOARD PROCESSING & STORAGE
PCB 1016/1242 Sediment	2(25-100 g)	G/Aluminum Foil Septum (~~1~~)(~~8~~)(~~9~~)	Cool to 4°C
PCB 1248 Sediment	2(25-100 g)	G/Aluminum Foil Septum (~~1~~)(~~8~~)(9)	Cool to 4°C
PCB 1254 Sediment	2(25-100 g)	G/Aluminum Foil Septum (~~1~~)(~~8~~)(9)	Cool to 4°C
PCB 1260 Sediment	2(25-100 g)	G/Aluminum Foil Septum (~~1~~)(~~8~~)(~~9~~)	Cool to 4°C
PAH's Sediment	2(25-100 g)	G/Aluminum Foil Septum (~~1~~)(~~8~~)(~~9~~)	Cool to 4°C
Copper Sediments	25-100 g	G/Teflon Septum	Cool to 4°C
Nickel Sediments	25-100 g	G/Teflon Septum	Cool to 4°C
Lead Sediments	25-100 g	G/Teflon Septum	Cool to 4°C
Cadmium Sediments	25-100 g	G/Teflon Septum	Cool to 4°C
Chromium Sediments	25-100 g	G/Teflon Septum	Cool to 4°C
Mercury Sediments	25-100 g	G/Teflon Septum	Cool to 4°C

G = Glass

TABLE 15

1985-1986 BUZZARDS BAY SEDIMENT SURVEY

SAMPLING PARAMETERS AND ANALYTICAL METHODS

PARAMETER	METHOD	REPORTED AS	LIMITS OF DETECTION	REFERENCE	MAXIMUM HOLDING TIME
Grain Size Analysis					
- Sediment	"Pipet Method"	phi size (mm)	--	EPA Draft Document 1985	--
Metals Analysis					
Cadmium - Sediment	AA spectro air-acetylene flame (3)	mg/kg (d.w.)*	0.2	EPA Method 213.1	6 months
Total Chromium - Sediment	AA spectro air-acetylene flame (3)	mg/kg (d.w.)*	0.2	EPA Method 218.1	6 months
Total Copper - Sediment	Atomic Absorption, direct aspiration (3)	mg/kg (d.w.)*	0.2	EPA Method 220.1	6 months
Total Lead - Sediment	Atomic Absorption, direct aspiration (3)	mg/kg (d.w.)*	0.5	EPA Method 239.1	6 months
Total Mercury - Sediment	Manual Cold Vapor Technique	mg/kg (d.w.)*	0.0002	EPA Method 245.5	6 months
Total Nickel - Sediment	AA spectro air-acetylene flame (3)	mg/kg (d.w.)*	0.3	EPA Method 249.1	6 months
Total Silver - Sediment	AA spectro air-acetylene flame (3)	mg/kg (d.w.)*	0.2	EPA Method 272.1	6 months
Total Zinc - Sediment	Atomic Absorption, direct aspiration (3)	mg/kg (d.w.)*	0.2	EPA Method 289.1	6 months

TABLE 15 (CONTINUED)

PARAMETER	METHOD	REPORTED AS	LIMITS OF DETECTION	REFERENCE	MAXIMUM HOLDING TIME
PAH's - Sediment	Gas chromatography/Mass Spectrometry	ug/kg (d.w.)*	(1)	EPA Method 3510 (2) EPA Method 8100 (2)	7 days to extraction, analysis.
Polychlorinated Biphenyl Analysis					
PCB 1016/1242 - Sediment	Gas chromatography	ug/g	0.16	EPA Soxhlet Procedure (3)	7 days to extraction, 40 days to analysis.
PCB 1248 - Sediment	Gas chromatography	ug/g	0.084	EPA Soxhlet Procedure (3)	7 days to extraction, 40 days to analysis.
PCB 1254 - Sediment	Gas chromatography	ug/g	0.56	EPA Soxhlet Procedure (3)	7 days to extraction, 40 days to analysis.
PCB 1260 - Sediment	Gas chromatography	ug/g	0.17	EPA Soxhlet Procedure (3)	7 days to extraction, 40 days to

(1) No standard available for quantitation. The Mass Spectrum obtained was compared to a Mass spectral data base for identification.

(2) Proposed Sampling and Analytical Methodologies for Addition to Test Methods for Evaluating Solid Waste - Physical/Chemical Methods. SW-846. Second Edition. 1984.

(3) U.S. EPA. Environmental Monitoring and Support Laboratory. Interim Methods for the Sampling and Analysis of Priority Pollutants in Sediments and Fish Tissue. 1980 Oct. Cincinnati, OH.

* Dry weight

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